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# Geo-resources and techno-cultural expressions in the south of the French Massif Central during the Upper Palaeolithic: determinism and choices

Vincent DELVIGNE, Paul FERNANDES, Peter BINDON,  
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## Abstract

The petro-archaeology of silicites defines the origin of the siliceous raw material found in archaeological sites. Recent methodological advances, like more precise facies definition, determining the provisioning path for silicites in studied sites, the 'evolutionary chain concept' and precise mapping of siliceous mineral domains, enable us to identify not only the location where any particular flint formed (primary outcrop), but also where it was collected (primary and secondary outcrops).

Exhaustive studies of Upper Palaeolithic flint collections from sites in the south of the French Massif Central (Late and Final Gravettian: 'Le Blot' and 'Le Rond-de-Saint-Arcons'; Badegoulian: 'Le Rond-du-Barry' and 'La Roche-à-Tavernat') reveal an unexpected diversity of raw materials indicative of huge territories being exploited. Accordingly, we have developed a new figurative model for the origins of lithic raw material discovered in these archaeological sites, not as a site-centred radiant form, but more akin to an interrelated network of places, which is congruent with ethnographic and geographic data. The different types of silicite in the lithic industries correlated with their position within the 'evolutionary chain' allow speculation on the choices made by prehistoric hunter-gatherers within the natural constraints they faced. This in turn enables the addition of the mineral space into reconstructions of the paleo-social-space.

**Keywords:** Upper Palaeolithic, Petro-archaeology, French Massif Central, evolutionary chain of silicites, paleo-geography, territory, settlement.

## Résumé

*La pétroarchéologie du silex s'attache à définir les origines des silex retrouvés dans les sites archéologiques. Au vu des avancées méthodologiques récentes (définition toujours plus précise des faciès, vision dynamique du parcours du silex dans son environnement – chaîne évolutive –, mise en place d'une cartographie précise des domaines minéraux siliceux) il est aujourd'hui possible de préciser non seulement le lieu de formation du silex (gîte primaire) mais également son lieu de collecte (gîte primaire ou secondaire).*

*L'étude exhaustive des silex de collections archéologiques du sud du Massif central à plusieurs moments-clés du Paléolithique supérieur (Gravettien récent et final : « Le Blot » et « Le Rond-de-Saint-Arcons » ; Badegoulien : « Le Rond-du-Barry » et « La Roche-à-Tavernat ») a permis la mise en évidence d'une diversité insoupçonnée de matériaux représentatifs d'un vaste litho-espace (espace géographique comprenant l'ensemble des matériaux considérés). Nous proposons donc un modèle de représentation de l'origine et de l'acquisition des matières premières retrouvées sur un site archéologique, non plus sous une forme sito-centrée (en étoile), mais sous la forme d'un réseau de lieux, plus en accord avec les données issues des observations ethnographiques et géographiques. La représentation des différents types de matériaux au sein des industries lithiques, ainsi que leurs modes d'introduction sur le site, permettent de distinguer les choix opérés par les hommes et les contraintes naturelles subies, autorisant dès lors l'inscription sémantique du litho-espace dans un essai de reconstruction du paléo-espace social.*

**Mots-clés :** Paléolithique supérieur, pétro-archéologie, Massif central français, chaîne évolutive des silicites, paléogéographie, territoires, peuplement.

## 1. INTRODUCTION

The French Massif Central is an area deemed to be poor in silicites (by silicites we refer to all silicified rocks of chemical, biochemical or diagenetic origin at the exception of sandstones [and particularly quartzitic sandstone]. It allows avoidance of the term 'flint,' whose meaning is controversial and leads to misunderstandings between geologists, petrographers, sedimentologists and archaeologists. In this manuscript, we thus use the term 'flint *sensu stricto*' to refer to rocks made of siliceous epigenesis and carrying a cortex, and the term 'flint' in the archaeological sense to refer to the lithic objects worked by man), both in quantity and quality (e.g. VIRMONT, 1981; BRACCO, 1992, 1994a, 1995, 1996; BOSSELIN, 1997; SURMELY *et al.*, 1998, 2008; SURMELY, 2000; SURMELY & PASTY, 2003; ANGEVIN, 2010). However, since the 1980s, the pioneering work of A. Masson (1981) then, during the following thirty years, the surveys carried out by various participants in regional research, showed the inaccuracy of this silicite poverty model (FERNANDES *et al.*, 2008a, 2008b, 2009; FERNANDES, 2012). Various silicites are indeed present, even if the heart of the massif does not contain as much as its sedimentary margins, such as the south of the Paris Basin with its famous blonde flints *s.s.*, the Rhone corridor or the Aquitaine Basin. Primary deposits containing large quantities of silicite of good quality, but often of reduced extent, are common: for example, the Saint-Léger-du-Malzieu (Lozère) deposits, or Saint-Pierre-Eynac (WRAGG-SYKES *et al.*, 2017), Arlanc and the Borne Valley in Haute-Loire, the Limagne of Auvergne in Puy-de-Dôme or the Aurillac Basin in Cantal. Similarly, secondary silicite deposits in alluvial contexts are numerous and contain siliceous pebbles with volumes of several cubic decimetres, such as the multiple secondary deposits of Naussac (Lozère) in the upper Allier Valley. Thus, in contrast to its reputed paucity in silicites, the French Massif Central is far from deprived of materials suitable for knapping.

The aim of this work is to address the reconstruction of past territories based on data from petro-archaeology. Our analyses integrate the notion of the evolutionary chain specific to silicites and are founded on detailed

petrographic characterisation of all the elements of an archaeological series, without prior visual sorting. The analyses make it possible to identify economic behaviour and to determine and describe relationships between localities. Careful examination of both the most abundant and the rare materials, sometimes present in a single specimen, allows the extent of the supply area to be established and the procurement patterns of prehistoric groups to be defined.

## 2. MATERIAL AND METHOD

### 2.1. Read and understand silicites

Petro-archaeology (ŠTELCL & MALINA, 1970) is a discipline at the crossroads of geology and archaeology, and the outcomes of the discipline are essential to understanding the economic and social behaviours of prehistoric humans. However, for various academic, scientific and methodological reasons, petro-archaeology has long remained at the margins of its two mother-sciences and is often considered as an appendix to typological and technological studies, which, during the twentieth and the beginning of the twenty-first century were the leading methodologies used in archaeological flint analysis.

The petrography of siliceous rocks has two main interests for prehistorians:

- 1) It contributes to the reconstitution of techno-economic systems by documenting the first phases of the *chaîne opératoire*, namely raw material procurement coupled to lithic technology, giving the modes of introduction of the silicites into sites;
- 2) It highlights supply routes, supply areas and more generally helps to identify prehistoric territories.

Our approach is based on two complementary methods: the so-called 'classical approach', widely developed in the 1980s by M. & M.R. Séronie-Vivien (1987) in the Aquitaine Basin and a 'dynamic approach', integrating the concept of evolutionary chain of flint (*infra*). Indeed, the work of the petro-archaeologist is not only to identify the genetic type of a silicite, pointing to

its stratigraphic origin and the initial geological formation from which it originates, but also its geological type, which allows the place where it was gathered by prehistoric man to be located. The singularity of our approach is therefore to give a temporal dimension to silicites, integrating them into evolutionary chains, a concept defined and developed in Auvergne (France) during the last ten years by P. Fernandes, V. Delvigne, M. Piboule and J.-P. Raynal (FERNANDES & RAYNAL, 2006; FERNANDES *et al.*, 2007, this volume; FERNANDES, 2012).

The concept is based on the observation that silicites, which are metastable in their environment, undergo transformations to their mineral structure during each physico-chemical modification occurring in their place of origin and during changes in their locations. This evolution, which is dependent on mineralogical modifications induced by a search for the state of equilibrium represented by quartz (THIRY *et al.*, 2014), not only affects the external envelope of the rock, but its total volume. It is expressed at different scales, namely: macroscopic, mesoscopic, microscopic and ultramicroscopic. Thus, during analyses, it is necessary to quantify the degree of evolution of the figured elements (or allochems) and of the matrix (or orthochem), in order to revisit the archaeological object at each stage of its evolutionary chain. Of course, before carrying out this operation, it is necessary to have first described the evolutionary chains of the geological silicites, since each type of silicite has a distinct evolution. Several different geological types may thus derive from the same genetic type. Identifying and tabulating the various evolutionary stages play an important role in the archaeological reconstitution of prehistoric economies, because humans have made abundant use of secondary deposits (TURQ, 2005).

Silicites may therefore have lived a complex history before their collection by humans and they bear characteristics generated in the different environments they passed through. The deposits are divided into eight basic categories which can be combined and mixed: primary deposits; sub-primary deposits; alteritic deposits; colluviums; alluvial deposits of active or fossil river courses; coastal beaches, and moraines.

Just as the collection area of lithic raw materials can be confusing within primary deposits (in the case of flint mines for example), collection areas may also be remote from their primary source, such as pebbles found on old terraces or on beaches.

In addition to the weathering analysis of siliceous rocks (*supra*), the reading of the last surface state (LE RIBAUT, 1977) of the neocortical zones or of the natural lithoclase, identifies the silicite collection site, which in turn may reveal particular human behaviours.

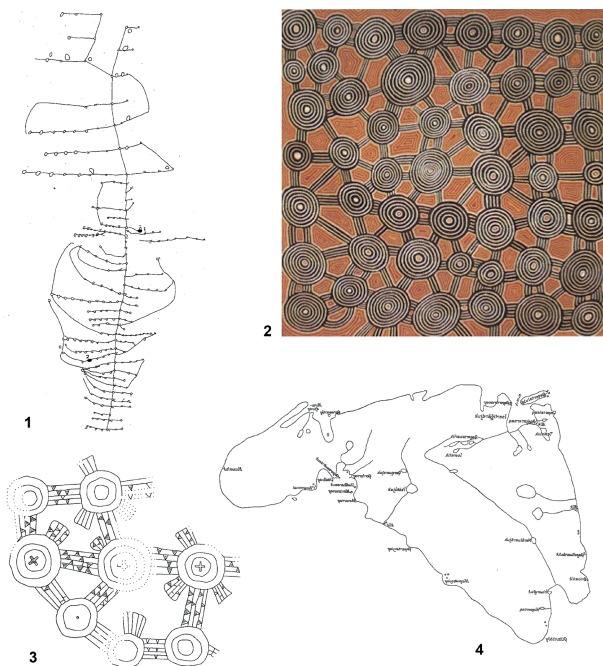
As we have shown in our previous works (DELVIGNE *et al.*, 2014a, 2014b; DELVIGNE, 2016), this degree of precision in petrographic analysis is important. The diversity, quantity and type of introduction of materials, from coherent geographical areas into archaeological sites (i.e. geotops), makes it possible to identify either a direct, or indirect, procurement strategy; which in turn reflects the extent of territories used in the past.

## **2.2. Travel, route, territories: the contribution of geography**

The tools of geology are employed in the analysis methodology for silicite types, but it is those of geography which are used for elucidating territoriality.

In the Western concept of space, the smallest piece of land is owned and managed by a physical or legal entity, without there being, in theory, an empty area at the scale of the 'territory' of a group. A territory is perceived as being the sum of the individual possessions, the national territory for example. However, this structuring of space differs from that of current and sub-current nomadic peoples, notwithstanding their economic system (Fig. 1). In these, named places corresponding to points of interest, or *foci*, of particular activities are recognised. These *foci* are also linked by routes that have somewhat different status to that of the former (the non-places of M. AUGÉ, 1992). Apart from regular routes and identified locations, areas exist that are rarely frequented and are 'outside' principally frequented zones (TINDALE, 1974; COLLIGNON, 1996). Although the peoples of the Palaeolithic are considered





**Fig. 1** – 1: Map of a Nigerian Tuareg Peul (GOULETQUER, 1990, p. 486); 2: Tingari dot painting, west of Kiwirrkurra, Australia (P. Bindon); 3: Amerindian map, Spiro mound, Oklahoma, engraved on a shell (LAFFERTY III, 1994, p. 202); 4: Inuit map (RASMUSSEN, 1930, p. 11).

nomadic, current scientific representations of past Palaeolithic territories appear as cohesive and homogeneous zones covering large areas. Sometimes these zones illustrate the spatial distribution of certain objects, or perhaps the region occupied by a given 'culture' (defined by the distribution of related sites), or as maps on which radiating lines connect resources to 'camps' (as in the case of raw material studies). Here, we propose to adapt the methods of ethnography, and social geography, to prehistory and to consider prehistoric territories in the form of networks of places (DEBARBIEUX, 1995, 2009).

To do this, it is first necessary to determine the origin of silicites found in archaeological sites, since in addition to demonstrating their abundance, these objects intrinsically contain spatially valuable data (e.g. MEROC, 1943; VALENSI, 1955; DEFLANDRE, 1966; MASSON, 1981; DEMARS, 1985; MAUGER, 1985). However, the simple assimilation of the litho-space (considering a given archaeological level and for which the

establishment of deposits is well known, we call litho-space, the geographical space defined by the maximum extent sketched by the origin of the raw materials found in this level) of a single site into the exploited geographical space and/or territory of a given group is unsatisfactory, because it fails to consider the underlying humanly contrived mechanisms relating to the presence of the materials in the sites. Neither does it account for behavioural factors external to the site, such as the possible places frequented that leave no direct material trace. Consequently, the analysis remains site-centric, which, from the point of view of spatial management and territorial study, is unsatisfactory, since social geography has shown that it is the totality of interconnections between places that carries spatial meaning and determine territorialisation (e.g. BONNEMAISON, 1981; BERNUS, 1982; DI MEO, 1998). Therefore, only the networks of the various litho-spaces obtained for sub-contemporary sites and the integration of the geographical values (in the spatial, social and economic sense) of all available elements can lead us to an understanding of the management of space at different times during the Palaeolithic.

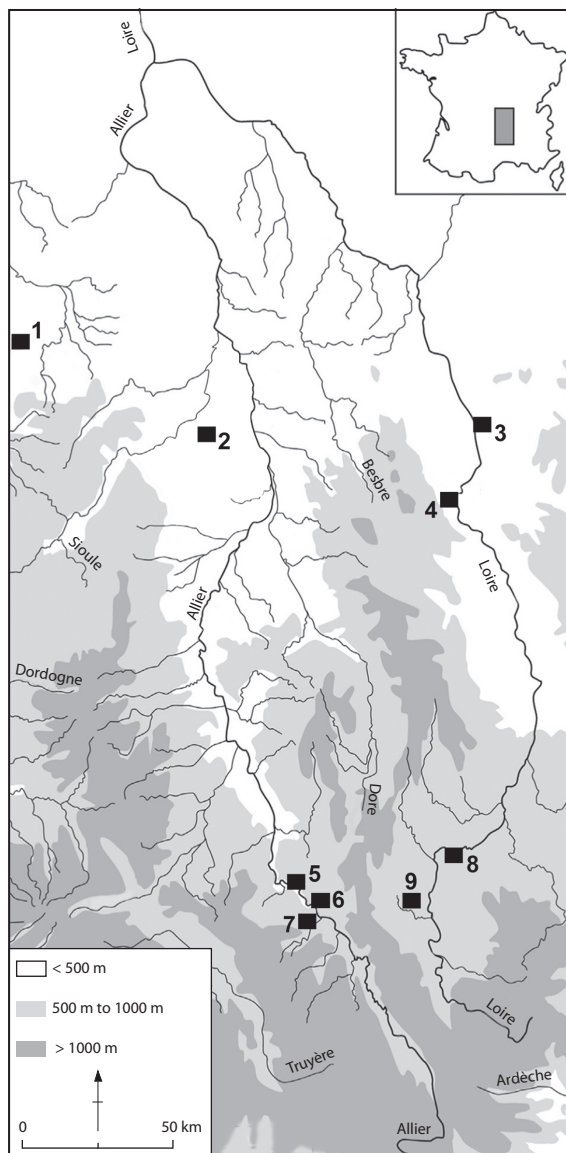
In order to reconstitute the territories of the past in the form of a network of places, we have adopted three postulates:

- 1) a paleo-ethnographic truth for the studied elements: all objects coming from the same level can be considered to belong to the same set (so long as the taphonomic integrity of the level in question is convincing and the remains have 'chrono-cultural homogeneity');
- 2) territorial temporal stability: since territories are primarily societal constructions, their structure does not vary significantly while the cultural system governing them persists; the absence of strict contemporaneity between sites is therefore not a problem while ever cultural entities remain coherent (i.e. that of prehistoric techno-cultures);
- 3) structural simplification modifies networks: the recurrence of and crossing of routes permits the registration of two distinct places within the same network. This is a direct inference from the second postulate since a temporal equality is equivalent to a spatial equality.

### 2.3. The Body of the Study

The studied corpus comes from eight archaeological sites belonging to the second half of the Upper Palaeolithic (Fig. 2) and consists of about 20,000 artefacts. While the southern sites of the Haute-Loire Department ('Le Blot', 'Le Rond-de-Saint-Arcons', 'La Roche à Tavernat', 'Le Rond-du-Barry', 'Cottier') provided the major part of the study, the addition of some northern

sites ('La Contrée Viallet', 'La Faye Godet', 'La Grange Jobin') enriched the results. In the rest of this work, we deliberately ignore techno-economic aspects - namely, the reconstruction of the *chaîne opératoire* using the domain of procurement of the lithic materials: local (<10 km from the site), semi-local (10-100 km from the site), distant (>100 km from the site) (for more details see DELVIGNE, 2016) - preferring to focus on the origin of geo-resources and the notion of prehistoric territories.



**Fig. 2** – Location map of the sites mentioned in the text. 1. La Faye Godet; 2. La Contrée Viallet; 3. La Grange Jobin; 4. La Goutte Roffat; 5. Le Blot; 6. Le Rond de Saint Arcons; 7. La Roche à Tavernat; 8. Cottier Cave; 9. Le Rond-du-Barry.

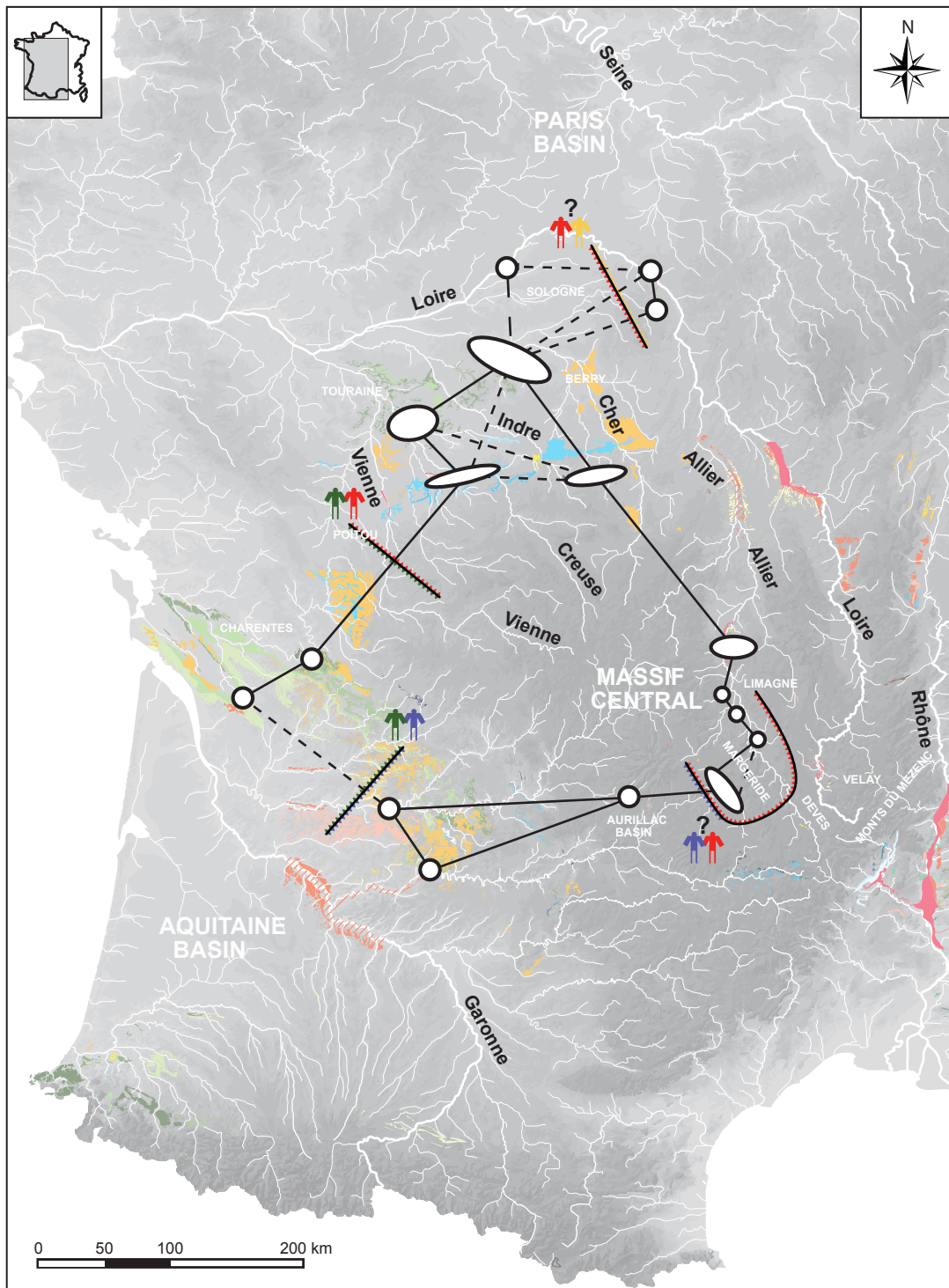
### 3. RESULTS

The results concern different time intervals in the Palaeolithic of Auvergne: the Late Gravettian, the Final Gravettian and the Badegoulian. These three chronological windows occur within a particular climatic context, namely during and after Glacial Stage 3 (GS3) - when global climate exhibits significant contrasts. We provide here the archaeological synthesis from the detailed petro-archaeological analysis of the series studied. The raw information relating to the diagnosis of the different types of silicites, too long to expose in the context of this paper, are presented in the thesis of one of us (DELVIGNE, 2016).

#### 3.1. Late Gravettian

After a settlement hiatus covering the whole Early Upper Palaeolithic period, i.e. Chatelperronian, Aurignacian and Early and Middle Gravettian, the first signs of occupation of the south-east of the French Massif Central appear in the Late Gravettian, in levels 35 to 52 of 'Le Blot Rock Shelter' at Cerzat (Haute-Loire) (DELPORTE, 1972; BUISSON, 1991; KLARIC, 1999, 2000). This site seems isolated in the landscape of the Late Gravettian, since its closest contemporaries are about 150 km to the south in Languedoc and to the west in Périgord (KLARIC, 2003).

Based on unpublished stratigraphic work by J.-P. Dugas, who was the architect of the revision and homogenisation of the very complex stratigraphy of 'Le Blot Rock Shelter' initially revealed by the works of H. Delporte, and on our own observations (vertical mapping of object refitting, DELVIGNE, 2016), we have



**Fig. 3** – Map of the Late Gravettian territory. White circles indicate areas of special interest (*foci*); solid lines illustrate relationships proven by material evidence; dashed lines correspond to relations supposedly induced by the structural simplification of the network; the herringbone lines represent possible boundaries between human groups; the pictogram of two individuals indicates likely trade areas. The coloured areas represent the formation with silicites; colours follow the international stratigraphical chart.



grouped the different levels attributed to the Late Gravettian of 'Le Blot' into two large sets: the lower set G1, and the upper set G2. Each contains about thirty different types of flint in varying quantities, ranging from isolated pieces to several hundred objects. Petro-archaeological analysis shows that only a few silicites were collected in the local area, and most of the tool-kit is made of silicites from more distant domains. Materials from the semi-local domain show close relationships with those of the northern lands of Limagne and western Margeride: Truyère Valley, Aurillac Basin and even Aquitaine Basin. Remotely sourced materials point to the south of the Paris Basin (Pays Fort, Berry, and Touraine), the Poitou, and Charentes (Fig. 3).

The harvested silicites, at least those of the Limagne, seem to correspond to milestones on the route taken by humans before their arrival at 'Le Blot'. The absence of material from the high valleys of the Allier and Loire and the hiatus of sub-contemporary sites in the regional space, suggests that 'Le Blot' should be considered as a '*terminus*' on the margins of a main territory anchored further to the north in the southern border of the Paris Basin where there are known occupations attributed to the Late Gravettian (KLARIC, 2003). This hypothesis is reinforced in the upper ensemble, G2, where there appears to be a shift away from the mineral resources of the Limagne to the marine Cretaceous flints s.s. of the southern margins of the Paris Basin (Touraine and Berry). Nevertheless, during the entire Gravettian period, no modifications were made to either the availability of materials or the function of the site (which was a temporary camp with activities related to the hunt, namely, the manufacture of lithics and repair of weapons used for reindeer hunting).

In this hypothesis, the upper Allier Valley considered as a hunting area, would therefore be frequented only during expeditions for the procurement of animal resources, especially meat. The change in lithological diversity between the lower and upper sets, G1 and G2, is the only real change in livelihood activities; the other registers remaining unchanged. This may mean there was a change of group, a partial abandonment of Velay followed by a return, or a change in the

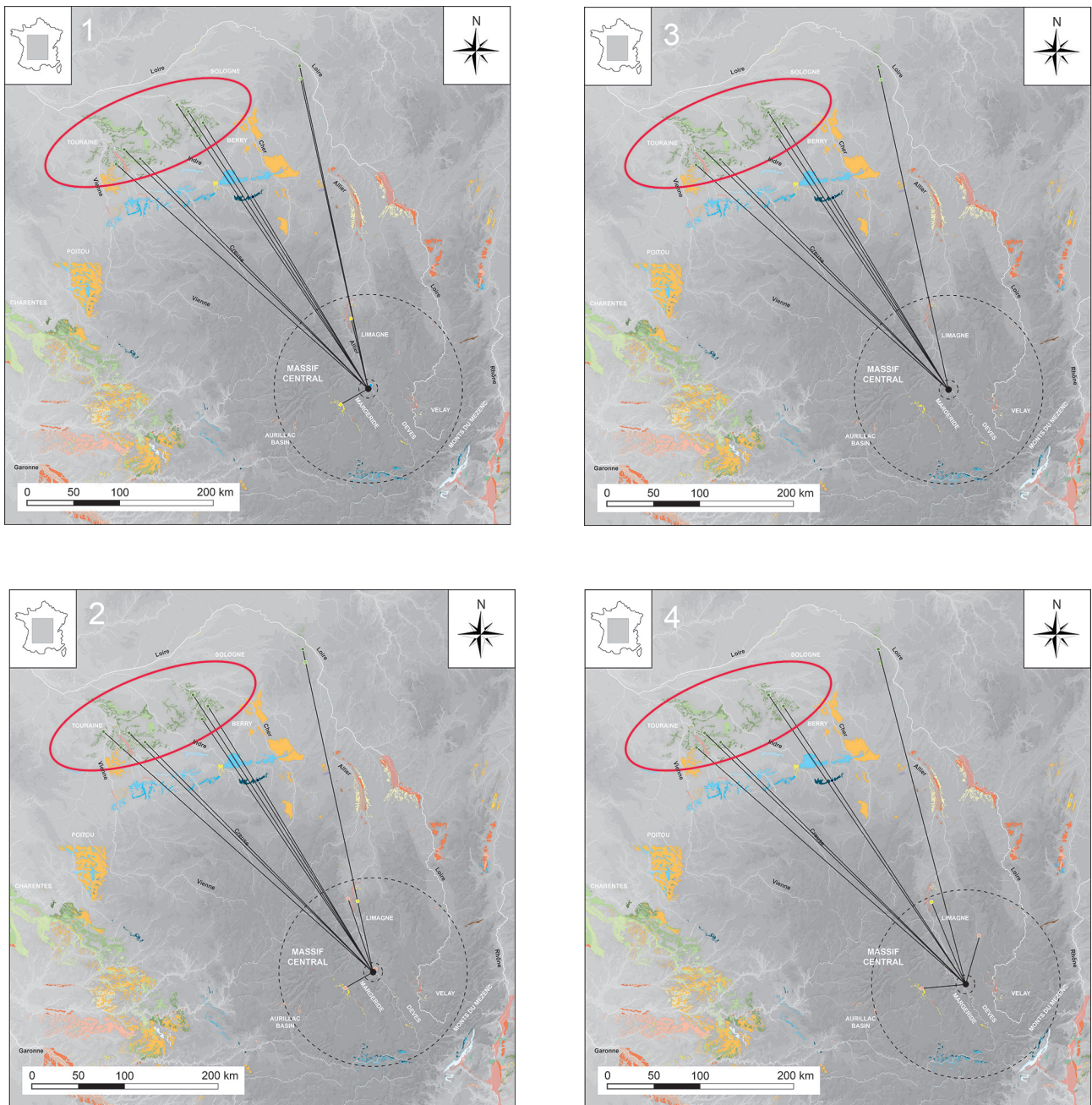
status of the Limagne. Finally, besides its probable chronological position in the second part of the Late Gravettian (*sensu* KLARIC *et al.*, 2009), the techno-economic and lithological variability of the assemblage of 'Le Blot' seems to hinge on the type and duration of occupation, features that are themselves subordinate to the status of the site within the territory.

### 3.2. Final Gravettian

Following the Late Gravettian, the occupation of the upper Allier Valley continues during the Final Gravettian, identified in layers 22 to 34 of 'Le Blot' (DELPORTE, 1972; VIRMONT, 1981; BOSSELIN, 1992a, 1992b, 1997, 2007; SURMELY & HAYS, 2011) and in Level C of 'Le Rond-de-Saint-Arcons' (BOULE & VERNIÈRE, 1899; DELPORTE & VIRMONT, 1983; FONTANA *et al.*, 2014).

The lithic raw material supply is marked by the virtual absence of local materials and by the rarity of Limagne and western Margeride rocks. In addition to their large quantity, the contribution of remotely sourced flint (*s.s.*) in the form of entire or barely pre-formed blocks, illustrates an anticipation of future needs, while the rare semi-local silicites present in the archaeological series are probably the result of opportunistic human behaviour. Nevertheless, the absence of local and semi-local materials in the lithic tool-kits is not linked to a lack of knowledge of the environment. Rather, it demonstrates rational behaviour by humans who plan the transport of raw materials over long distances rather than searching for suitable knapping materials in close proximity even though other activities may, of necessity, demand a large part of their time. Similar behaviour is recognised as occurring contemporaneously on the western side of the French Massif Central, between Périgord and Quercy, at 'Les Peyrugues Rock Shelter' (GUILLERMIN & MORALA, 2014).

The three different phases of the Final Gravettian of 'Le Blot' and the small assemblage of 'Le Rond-de-Saint-Arcons', layer C are marked by the similarity of their lithological spectra (Fig. 4) which, like the last occupations of the Upper Gravettian of Le Blot (*supra*), are largely dominated by flint *s.s.* from the south of the Paris



**Fig. 4** – Comparison of the litho-spaces of the three sets of the Final Gravettian of 'Le Blot' and the 'Rond-de-Saint-Arcons'.

Red circles show the geographical space from where the lithic raw materials originate.

1: Lower set, P1 of 'Le Blot', number of genetic types = 23;

2: Middle set, P2 of 'Le Blot', number of genetic types = 25;

3: Upper set P3 of 'Le Blot', number of genetic types = 14;

4: Level C of the 'Rond-de-Saint-Arcons', number of genetic types = 14.

The coloured areas represent the formation with silicites; colours follow the international stratigraphical chart.

Basin; notably the Upper Turonian of Touraine and the Lower Turonian of Berry (DELVIGNE *et al.*, 2017). Its quantity and diversity confirm

knowledge of the mineral potential of this very distant area (more than 200 km away) and invite us to consider the direct procurement of materials



upstream of the route bringing humans to Auvergne, at the southern margin of their territory. There seems therefore to be certain continuity in the mode of occupation and in the status of the upper Allier Valley during the last expressions of the Gravettian. Indeed, in addition to the massive influx of Cretaceous flint *s.s.* from the southern Paris Basin in the Late and Final Gravettian of Le Blot (unequalled in other regional sites), the site functions and activities conducted there seem to persist throughout the complete sequence.

### 3.3. Badegoulian

After an occupational hiatus of two millennia corresponding to the time range of the Solutrean, the arrival of the Badegoulian marks a break in the management of the space lying between the Loire and Allier valleys. This period is today represented in the east of the Massif Central by eight sites divided equally between the Allier Valley and the Loire Valley. Four are in the northern part of the region: 'La Faye Godet' (LAFARGE, 2014), 'La Contrée Viallet' (LAFARGE, *op. cit.*), 'La Grange Jobin' (PASTY & ALIX, 2010) and 'La Goutte Roffat' (DIGAN, 1993); and four are in the south: 'Le Blot' (DELPORTE, 1972; VIRMONT, 1981), 'La Roche à Tavernat' (BRACCO, 1992, 1994b), 'Le Rond-du-Barry' (DE BAYLE DES HERMENS, 1972; 1974; LAFARGE *et al.*, 2012; LAFARGE, 2014) and 'Cottier Cave' (VIRMONT & VIRMONT, 1973). The ages for these occupations range from 23,900 years calibrated BP to 20,500 years calibrated BP, thus within the accepted temporal variability of this period (DUCASSE *et al.*, 2014). We will focus here on the sites that provided the most convincing results, 'Le Rond-du-Barry' and 'La Roche à Tavernat'.

The 'Rond-du-Barry' Cave, located in Polignac in the Department of Haute-Loire, has a long sequence ranging from the Mousterian to the Middle Ages and recent dates show a continuous occupation of the cavern throughout the Badegoulian (RAYNAL *et al.*, 2014). Based on the techno-typological criteria of the lithic industry, layer F, containing the Badegoulian occupation, has been divided into different sectors which probably have chronological validity (LAFARGE, 2014); a sectorisation that the resumption of excavations after 2016 seems to confirm.

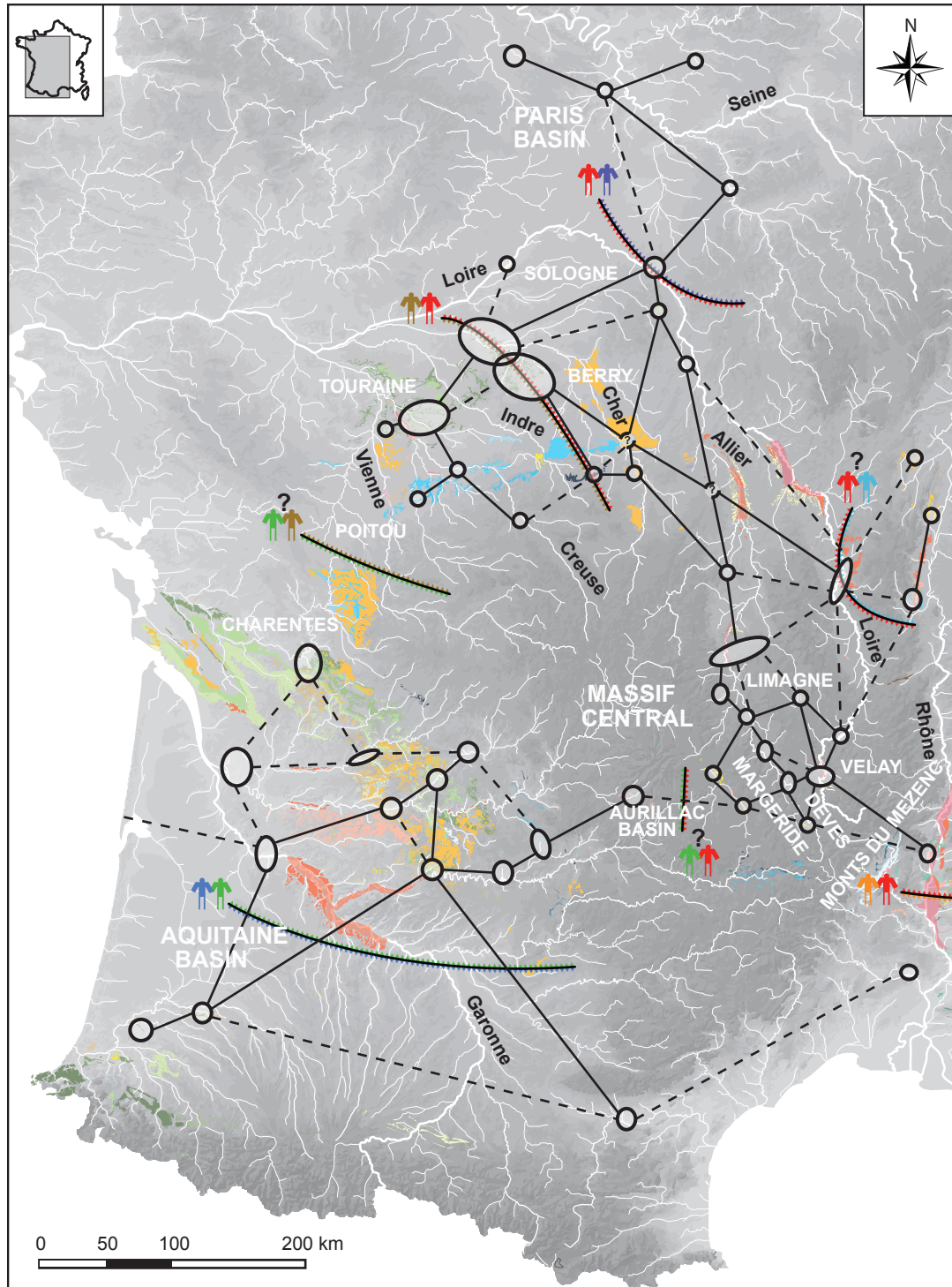
In a space at the interface between the Mediterranean and Atlantic worlds, 'Rond-du-Barry' Cave seems to play a particular role marked by original characteristics: a longer occupation than in other more-or-less contemporary sites; a diversity of activities; a strong recurrence of occupations and a multiplicity of geographical influences, especially southern ones. The analysis of the F-layer artefacts shows that the percentage of local and semi-local materials increases significantly from the beginning of the Badegoulian, illustrating the flexibility of the lithic technical system alongside an expert knowledge of the mineral environment. Local raw materials appear to have been collected from various deposits during other subsistence activities, including hunting, while the contribution of semi-local flints probably comes from gathering them along the route leading to Velay and/or from collection during logistic expeditions whose primary objectives remain difficult to determine. Concurrently, the diversity of flint types increases significantly, reaching 60 genetic types. Among them, the 40 of known origin confirm that forays were made in various directions, not only confirming contact by the population of the massif to the south and centre of the Paris Basin, but also with the Rhone Valley to the east and the Cantal massif to the west.

For comparative purposes, we analysed the origin and management of the geo-resources of the Badegoulian from 'La Roche à Tavernat', situated in the upper Allier Valley at Chanteuges (Haute-Loire). In this site, where the industry is predominantly made on quartz, we have recognised resource management strategies similar to those at 'Le Rond-du-Barry'. The local flints of the Borne Valley exploited at 'Le Rond-du-Barry' are supplemented by quartz at 'La Roche à Tavernat'. Approximately 30 types of flint point to the same localities as those identified for 'Le Rond-du-Barry'. However, if silicites from the Allier Valley are present in Badegoulian sites of the Loire Valley, the reverse is not true and no silicite from the upper and middle Loire Valley has been recognised at 'La Roche à Tavernat'. Perhaps this can be explained by a polarity in human movement.

The origin of the materials found in the Badegoulian sites in Auvergne shows that

crossings were made of the main interfluves of the regional space including the Margeride,

Devès and Mézenc Mountains, also, crossings were made in the middle reaches of the major



**Fig. 5** – Map of Badegoulian territory. White circles indicate areas of special interest (*foci*); solid lines illustrate relationships proven by material clues; dashed lines correspond to relationships supposedly induced by the structural simplification of the network; the herringbone lines represent possible boundaries between human groups; the pictogram of two individuals indicates likely trade areas. The coloured areas represent the formations with silicites; colours follow the international stratigraphical chart.

rivers, the Cher, Allier, and Loire, respectively towards Berry, Sologne and the centre of the Paris Basin. In Velay, the mountains, frozen or very heavily snow-covered and long considered almost impassable barriers, were penetrated, allowing materials to be gathered and probably other interactions to occur between humans from all margins of the Massif Central (Fig. 5). Additionally, all the sites attributed to the Badegoulian in Auvergne seem to develop

similar types of occupation, i.e. those of limited duration taking place during good seasons and during which various activities were undertaken. Local domains are intensively exploited, and camps are established near abundant resources found in particular places at certain times of the year; a mode of territorial management evoking that of the serial specialists of northern Canada described by L. R. Binford (1980) and taken up by F. Audouze (2007) for the Magdalenian of the

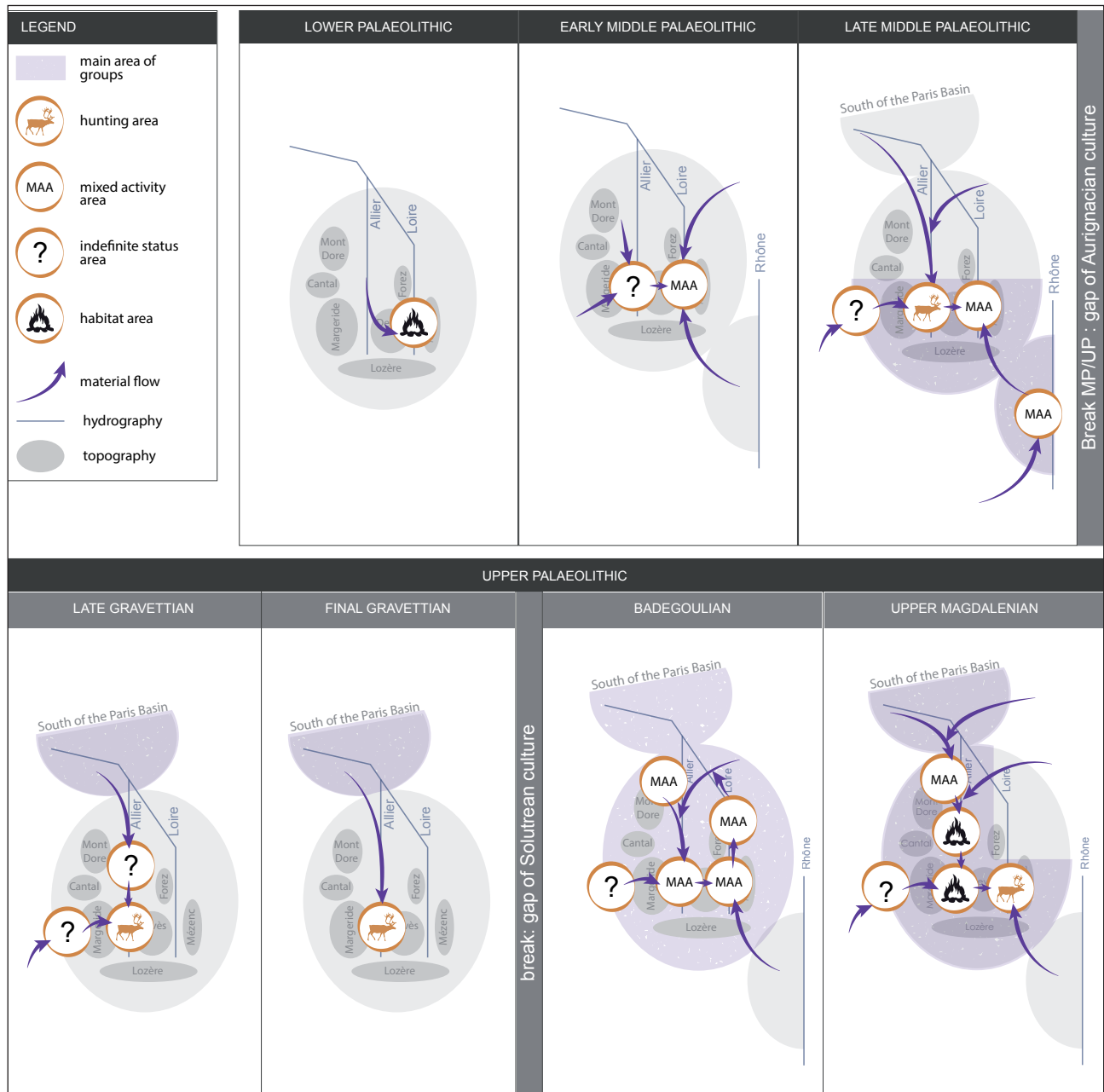


Fig. 6 – Hypothetical scheme of movement of humans in Velay in the Upper Palaeolithic deduced from the origin of raw materials.



Paris Basin. Thus, unlike during the Gravettian, the mid-mountains of Velay would no longer be frequented only on occasional expeditions, but localities became favoured places in a vast cycle of nomadism, marked out by longer and longer occupation events eventually integrating into a single territory that encompassed the southern Paris Basin and the southern part of the French Massif Central. Within this space, undoubtedly there was contact between groups from neighbouring areas for the exchange of goods and most probably individual relocations.

#### 4. CONCLUSION

Following our investigations, the circulation patterns of prehistoric humans in Velay established in the early 1990s can be enriched, especially for the so-called 'old phase' that develops from the Gravettian to the Magdalenian (BRACCO, 1992, 1994a). This ancient phase, hitherto regarded as culturally homogeneous, seems to be divisible into two stages, one that precedes and one that follows the Solutrean occupation hiatus (Fig. 6, previous page).

The first period, that incorporates the end of the Gravettian, is fully integrated into the previous model. In it, the proportion of distantly sourced lithic raw materials, mainly from the south of the Paris Basin, is relatively high and the reason behind the occupation of the western Velay seems to be the result of temporary displacements following one mobile resource, reindeer. Thus, we speak of the migration of human groups responding to pressure from an extrinsic factor; the Velay is exploited because of the presence of the reindeer, the interest of human groups being focused on an animal resource.

During the second phase when the percentage of distantly sourced silicites decreases in favour of local and semi-local materials, the Velay is integrated into the nomadic circuit and all the environmental resources are exploited over a longer duration. The migration of human groups then occurs under the pressure of intrinsic factors and the interest of the groups becomes focussed on a multi-resource space.

In addition to providing some answers to the 30-year old debate on the origin of flint in Velay (MASSON, 1981, 1982, 1983; TORTI, 1983, 1985; DEMARS, 1985; AUBRY, 1991), this work was an opportunity to model some of the territories of the Upper Palaeolithic of Auvergne in the unprecedented form of a network of places that is more in line with the theories of ethnography and social geography. It is now possible to outline the boundary of a vast Palaeolithic province incorporating Berry and Auvergne, the spine of which is articulated around the Allier Valley. Depending on the period considered, the limits of this area expand further westwards towards Touraine or, on the contrary, contract. Nevertheless, the existence of strong links with the neighbouring provinces to the east, west and south of the Massif Central seems to be a transcendent phenomenon which makes it possible to reconsider the place of Velay in prehistoric France; a place which, until now, was considered as a dead-end evolving on the sidelines of the main prehistoric centres. Now, it can be fully integrated into the network of ideas crossing Western Europe during all of the Upper Palaeolithic.

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