Region

Perigord corresponds geographically to Dordogne department, and covers ~9000km² between the highlands of the Massif Central and the lowlands of Bordeaux wine country.

Region of transition between the high lands of Limousin and vast plains of Aquitaine basin.

Preponderance of Middle and Upper Cretaceous limestone and tight network of valleys.

Jurassic limestone in thick; compact bands but only in small area.

Mostly composed Cretaceous sediments.

Cretaceous moyen and superior only dominate in NW and SE; only revealed along valley borders or slopes; in the interior of plateaus and hills disappear under layers of siderolithic and sands.

Stone horizons sometimes very weak and lots of variability in structure laterally and vertically providing a topography that while not as grand as the Massif itself, is much more variable with hills and valleys sometimes bordered by steep slopes, sometimes shallow slopes.

"...the topography that dominates the Dordogne and distinguishes the Perigord...consists of massive slabs of limestone deeply etched by rivers into a mosaic of elevated plateaus, a landscape under whose surface extend vast karstic systems of caves and whose valley walls house the natural cavities known as rock shelters or 'abris.'" p. 4.

Cretaceous outcrops make up the study area and have an important role in the topography but the valley bundles also play a role especially when considering human geography.

Perigord united by waterways and their valleys and made of petite countries with complementary resources (not defined by geologic or topographic limits).

The Perigord is marked by a number of structural markers: clines, anticlines, faults (others? need to briefly define and tell how they affect the overall geology).

Vézère Valley

Vézère Valley Description

Vézère in southeastern quadrant of the département within the Black Périgord region: characterized by dense forests (from which the name derives), abrupt gorges, and abundance of rock shelter sites.

Plateaus and steep valleys create strong topographic relief.

South eastern part of perigord in the petite territory Sardalais.

Vézère one of four major river valleys in Périgord that runs from NE to SW.

Vézère River major river.

Vézère originates in MilleVaches plateau (Limousin) nearly 1000 m above sea; at Brive joined by Corrèze (100 m above sealevel) 192 km down to junction w/ Dordogne.

Approximately 200 km long.

Flows into the Dordogne River at Limeuil and heads to Bordeaux.

Significantly narrower than northern river valleys—has potentially negative consequences on preservation from Aubas to Limeuil flows fifty km in a Cretaceous limestone encased valley this is due to river has broad/meandering loops between Le Moustier and Les Eyzies.

Between Thonac and Les Eyzies the valley is very narrow with large meanders.

Lots of meanders between Thonac and Les Eyzies because this is the location of strong/hardConiacian superior valley between Terrasson and Condat 1-3 km wide, only 80-90 m high result of Massif Central depression.

Limestone above laVilledieu has more vulnerable underlayers allowing river to widen; Between Villedieu and Bouillac stones more resistant and valley not as large, by Condat Bathonien limestone means that the valley is not more than 500 me wide.

Aubas-Montignac and LeBugue-Limeuil—because softer rock has allowed the river to cut out and build large alluvial terraces.

Area from Bugue to Limeuil wider.
**side valleys:**

*Number of above and below ground streams feed the River in the area*

A number of dry valleys or combes; major tributaries include Ladouch, Moulinet, Manaurie, la Beune, Les Fangues, Le Vimont, la Seignolle, Le Thonac, Le Turançon, Le Doiran, La Laurence, le Coly, le Cern, le Rieu, l’Elle, le Cublac.

*Also a number of dry valleys (define dry valley) created from old drainage paths and collapse of underground systems (image from past field season)*

Dry valleys at confluence rise gently, but after 3-4 km the sides become abrupt and close the valley; often deepened by underground rivers.

Tributaries largely infilled, and are green, humid sometimes swampy areas.

Smaller tributaries less sensitive to climate or hinterland change (evidence?)

Several side valleys show evidence of deep Holocene deposits meaning original valleys were much deeper (is it possible to define which ones?)

**Vallon du Castel-Merle example**

**navigation:** (determine why the shallowness (combination of alluvium and harder underlying rock and move to proper geological section as affect)

*Depth of river currently*

*Mention of it in historic times—needed a system of canals after Saint Léon*

*Shallowness has created a number of fords:

Number of fords influenced Paleolithic locations probably medieval/Roman?*

**slope:** (move this to structural as a consequence of the structure?)

~47 cm/km between Le Moustier and Les Eyzies

**flooding:** (move this to limestone geology as a consequence of the limestone)

At Brize river is torrential as it passes over impermeable Permian sandstone also inflow of Corrèze aids torrent.

Once it arrives at Terrasson, Jurassic stone permeable, and the river is much less torrential.

However flooding does occur due to winter rains, spring melt.

At Terrasson, the difference between low water and the first terrace is only 3-4 meters; this results in frequent flooding in the winter.

This low terrace can be explained by the by t-proximity to a rupture in slope at the confluence of the Crooèze and Vézère.

Winter flow 50 cubic meters per second; summer 12.

Winter flow is torrential and transports a considerable amount of gravel.

Has produced several large floods of up to 6.5 m

Last Wurmian glaciation saw floods 15-20 m above water level

**Formation**

**Factors**

Some areas of the Perigord show very flat surfaces in opposition to the geological slope. Analysis of superficial deposits, tectonic active, and topography show that these represent peneplains or erosion levels; shows that topography partially dependent on subaerial erosion this may be too much detail.

Towards the southwest the slope of the geological layers is greater than the topographic slope so that the topographic relief does not mirror the geological slope.

Slope from Massif Central to Garonne running NE-SW fixed general direction guides river formation (reason rivers run NE-SW) in Dordogne in general.
Tectonic effects more prevalent in the SE than the NW

Subtle undulations (orientation varisque) running NNE-SSW (this is why the lower Vezere coincides slightly with synclinal). Define this better...does it go under tectonic effect?

Tectonic folds and events have affected secondary sediments in the region, but erosion has leveled these events and made them difficult to see.

Excellent hand drawn image on p. 113 of the tectonic accidents in the area.

Synclines
- Sarlat
- Montignac

Anticlines (need to define/name ones in study area; note there are none if not present)
- Anticline that crosses the Vézère at St. Cirq brings up the Kimmeridgian levels (late Jurassic); this anticline was also responsible for halting the flow of early granitic alluvium and brought kaolin deposits near Les Eyzies (not sure this much detail is necessary).

Fault lines (need to define/name ones in study area; note there are none if not present)

Formation

Vezere one of the oldest generations of waterway in the Perigord, has maintained longitudinal direction since erosion of eocene surface; in contrast valleys of Manaurie and Journaica more recent stampien or Burdigalien (verify that these correspond with rest of formation epochs).

As the sea regressed, epeirogenic movement (which began the formation of the Pyrenees) caused the upheaval of Limousin, Quercy and the Perigord with a slope down towards the SW--this slope along with the retreat of the sea provided enough power to the watercourses to form the valleys and runoff shaped the hill flanks. May need to create new subsection on general formation from sea water regression, etc.

The surfaces created by the tertiary levels of erosion only apply to the summits and the highest hills.

Large valleys like the Vézère were formed as part of a more recent period of Erosion dated to the beginning of the Pliocene.

Great image on p. 220 of the different surfaces exposed in the topographic relief around Le Bugue. Combination of varied limestone and erosional histories has created a geologically complex and chronologically diverse landscape palimpsest.

Vezere still active between Tursac and La Madeleine (confirm).

Geology

Map of surface of erosion p. 193. Consider using this or simplified geological map to highlight areas discussed below.

2 distinct regions in study area marked by a transition from Jurassic to Coniacian limestones

1. North of Aubas

Valley between Terrasson and Condat 1-3 km wide, only 80-90 m high result of Massif Central depression.

Limestone above la Villedieu has more vulnerable underlayers allowing river to widen; Between Villedieu and Bouillac stones more resistant and valley not as large, by Condat Bathonien limestone means that the valley is not more than 500 m wide.

2. South of Aubas

Cretaceous (Coniacian) high limestone cliffs dominate the area.

From Limeuil to Aubas (possibly higher on one side of the valley--verify; quantify height with both a range and highest peak/peaks).

Coniacien superior one of the most recognizable horizons; 40 m thick at Les Eyzies; hard and compact (may have zones less hard where chemical erosion can work).

Coniacien superior dominates the Vezere from Montignac to Les Eyzies.

Coniacien inferior soft; brittle, easily eroded by water; not very thick no more than a dozen m.

Santonian soft; brittle, easily eroded by water; easily decomposes to form fine, white sands. (probably need to include Maestrichtien qualities too).
Cretaceous sediments of variable thicknesses and strength throughout study area which has implications for the formation of karstic system and course of river and tributaries

Plateaus:

- plateau composed of massive beds of Cretaceous limestone (this region entirely different than the Cretaceous region to the north of the central massif)
- limestone covered in Tertiary weathering products rich in flints
- "A partir des vallées, les hommes ont conquis peu à peu les <<interfluves>> modelés en coteaux; les parties hautes de ceux-ci portent des placages discontinus de sables, de graviers et d'argiles sidéro lithiques qui sont les lambeaux des épandages détrituques tertiaires. Sur ces sites de terroirs se localisent les <<pays au bois>>...Les progrès récents des défrichements dans les régions de Vergt et de Rouffignac, ont révélé l'ampleur exceptionnelle d'un faciès particulier du sidéro lithique; celui-ci consiste en un <<pavage>> de rognons de silex empâtés d'argile rouge de décalcification; parfois même, c'est un véritable revêtement d'argile à silex." p. 170 (note this is edited volume; if using quote might be better to say XXX in XXXX YYYY)

Cretaceous limestone plateaus covered in places by sands and clays sidéro lithiques
- these Tertiary deposits are Siderolithics deposits: situated underneath Sables du Perigord directly upon Cretaceous levels; represents a particular mode of erosion
- decomposition that led to siderolithic formation a result of tropical climate over Western Europe in the Eocene which aggravated chemical erosion too much detail again?
- siderolithic deposits rare east of Les Eyzies and west of Le Bugue
- siderolithic formation (clay with iron) part of the clay with flints

Overlay and mix with
- Sables du Perigord
- different from sidiro lithics by origin, age, and their placement in the stratigraphic column of Jurassic and Cretaceous materials
- result from ancient fluvial deposit of granitic sands originating in the crystalline massif
- consist of coarse sands, pebbles of quartz, felspar and sometimes attain considerable thickness—likely not glacial origin
- topography very ragged with clay limestone soils in some locations
- don't really find them in Sarladais; only in remnants of large overgrown valleys and shoulders of some plateaus: near Audrix; Meyrals, Marquay; Saint Amand de Coly

Valley Floors:

- limestone covered in gravel, sand and silt deposits from the river and its tributaries
- main river valley as granite alluvium; tributaries however are alluvium of local limestone (calcareous gravel without quartz grains "groise") --important for looking at where alluvium deposits come from—note Le Moustier lower from Vézère while upper is from river tributary
- "It is remarkable that the greater part of the alluvia are found at comparatively low levels in the main valley and its tributaries." p. 134 why is this remarkable?
- overbank—metres of loam and loamy sand (verify this statement and it's relation to one above; is this actually different than the flood plain?)
- where the Beune joins the Vézère=Travertine deposits
- incision of river into limestone cliffs has created a series of 5 different terraces+alluvial plain (need to say where these can be viewed what these indicate)

Terraces:

- formation is a cycle of activity and calm: during active cycles vertical erosion happened quickly shaping the talus that divides the terraces; during calm periods lateral erosions flattened tops of terraces
- Pleistocene—formation of terraces
- final phase Lat Pleistocene—erosive;
- Holocene—depositional; several meters of overbank loam deposited on Pleistocene terraces
two types of river terraces: 1. erosion, 2. embankments
cant date oldest, upper two terraces
lower 3 terraces dated by archaeological finds

**Alluvial plain:**

Vézère erodes ancient valley fill **(is this what makes up the different terraces? or perhaps covers?)**
at Tursac (Roebroeks et al.) note that "present river course appears to be dominated by courser overbank deposits and to have incised in older overbank loams"
this suggests that despite narrower valley constrained by towering cliff faces some evidence of river meandering within these geologic confines

**Evidence of infilling and dating of event**
paleochannel uncovered at Lespinasse
OSL samples from channel base give younger than Iron Age, while C14 suggest Iron Age for sedimentation of channel
Late Glacial and Early Holocene Age for sediments on terrace at Lespinasse
evidence of "incision and a change to a more energetic system, dated roughly to the Iron Age" corroborated by transects at Bout-du-Monde, Lespinasse, and Tursac p. 10
much younger age for incision in Tayac transect but still provides overall late date for final incision of river
final incision phase around Iron Age or later; since then energetic deposits with sand and levees

majority of current floodplain deposits mostly Holocene

**infill of valleys occurred** (explain how and where)

Paleolithic tributaries were much deeper and some may have been canyons **(mentioned above)**
humidity varied during Quaternary but Prehistoric peoples knew streams that were larger, stronger than today
last Wurmian glaciation saw floods 15-20 m above water level; caused small tributaries to become torrents with limestone, gravel, and sand creating larger and larger thalwegs
beginning of Neolithic saw upsurge in rains which probably multiplied water sources
small rivers don't have the power to regulate their profile; instead have found fissures and moved underground
combes with thalwegs above 180m date to the end of the Pliocene; those between 140-180 date to the beginning of the Quaternary could reconstruct the general construction of side valleys in the area! need to resolved this more cohesively with Holocene fill

**Uniqueness of Beune**

Beune unusual because it is rather larged and encased in sharp slopes and cliff faces; it is filled with 12-15 meters of limestone deposits but the upper part retains its branching profile; The river is full of marshes so that when it does empty into the Vézère a cascading effect happens (MILLS!) (no terraces like Vezere)
Beune has changed over 50 years (lots of infilling) so that it is now largely fields
Both Beune and Blàme (nea La Boissière) have been filled dure to the calcium rich waters which has encouraged plant growth and impeded flow
all streams near Les Eyzies an Sireuil drain regions of souble limestone making their water rich in lime
between the moulin de Gaurenne and forge of Eyzies slope broken up and water stagnates in floow a bit=marshy

**Archaeological Inferences**

"...thanks to the highly alkaline conditions fostered by the limestone deposits that enclose them, the archaeological horizons include not only stone tools and chipping waste but also, usually, a broad spectrum or organic material." p.6
what does the floodplain being primarily Holocene suggest about Holocene preservation?
large parts of Pleistocene deposits destroyed by erosion but some maybe in place
(1)"Some archaeological sites that nowadays are more or less at the level of the river valley...were several metres above the valley bottom during the (Late) Weichselian* p.4 doesn't affect Medieval deposits but important to remember
Karstic formations: (this may be split into a general introduction here and a more detailed introduction if the cave use analysis chapter is included)

Define cave and rock shelter;

note them in contrast to other karstic formations (trous, gouffres, puits, etc.)

Third group of features include man made modifications

Location

semi-continuous rock shelter horizon between Middle and Upper Coniacian

"A typical rock shelter in the Perigord...normally lies within a zone or stratum of the limestone parent rock that tends to be more friable and porous in composition and likely to retain more moisture than the zones lying above and below it. It is therefore particularly susceptible to differential erosion by weathering, both chemically...and physically..." p. 46

grottes often connected with crozes; grottes usually created in Coniacian and Maestrichtien levels

karstic erosin in Coniacian superior and Maestrichtien moyen

caves often cemented between levels of hard rock

Size and shape vary greatly from very small to large caverns to sinuous systems

p. 417 have not changed in size

Santonian not good for dissolution or maintaining karstic walls

Formation

most shelters above streams; originally started either as deep niches; or as exposure of caves

karstic systems developed prior to the existence of the Quaternary river valleys; oldest formed at the beginning of the Tertiary under siderolithic deposits but continue today; contemporary systems are those in limestone not affected by subaerial erosion

oldest zone of karstification higher than 200 m

caves around Les Eyzies carry evidence of seismic activity (1902 last one?)

2 main processes that act on formation: Chemical (corrosion) and mechanical (landslides, freezing)

freezing (find technical term)

water volume increases 9% when freezing and can exert several hundred kilograms of pressure per square cm when confined

this results in the deposition of éboulis—“detritus of limestone rock fragments detached by frost-weathering from the ceilings and walls of abris” p. 51

degree of cryoclastism can be measured in terms of the eboulis texture, that is the size and amount of eboulis present

nature of éboulis can also tell us something about the climate eboulis sec-course deposit, angular stones, little matrix (very cold, intense freezing periods) (need to explain why this equals cold period)

chemical weathering/leaching

this is the process of Corrosion: chemical action that either dissolves certain aspects or separation of granules:

Limestone primarily CaCO3 calcium carbonate with a large amount of impurities; Calcium carbonate susceptible to chemical weathering by dilute acids

however Perigord shelter deposits primarily affected during warmer, wetter climates because of the ability for water to percolate in the shelters

warmer, wetter periods chemical weathering primarily a result of humic rather than carbonic acids

this is a result of a biochemical rather than physico-chemical process (explain difference)

biochemical: presence of microorganisms (from human or animal presence; can be brought in through air currents) that affect the fermentation of organic substance in the topsoil (normally in upper, dryer parts of systems that are accessible to external influences)
breccia is the recrystallized calcareous concretions that have dissolved in the upper levels and migrated downward through illuviation

**Limitations on corrosion include:**

- porosity—compact rocks are more resistant to corrosion
- clay content—higher content of clay makes them more resistant
- fissuration: rocks with many smaller cracks offer a greater surface of attack for the water than rocks with a few large cracks
- sealed areas: prevent corrosion
- rainfall: more humid areas will increase the overall importance of corrosion
- temperature: regulates the amount of CO2 in water (higher in colder temps suggests that karstification might be increased in colder climates)
- vegetation: certain vegetations will give off more CO2 (highest in spring; lowest in winter)

**Running water**

- only in galleries with good slope; can cause a combination of chemical and mechanical wearing away
- the same trend of tributary streams going underground that contributed to the drying of their valleys also resulted in the creation of karstic systems

"Le cours d'eau est formé par la réunion sous Sireuil des Beunes de Tamniès et d'Allas0l'Evêque. En aval du confluent, le fond de la vallée, très plat et marécageux, cache en partie sous ses dépôts les escarpements de Coniacien qui le bordent; le remblaiement est évident et desgisements de silex taillés, appartenant au Paléolithique supérieur, sont enfouis sous 2 ou 3 mètres de débris constitutées, non par des éboulis descendus des pentes voisines, sauf au débouchée de quelques vallons latéraux, mais par des racines mortes enrobées de calcaire, par des masses d'humus aggloméré par du carbonate de chaux, par des tufs et des travertine formés sur place" p.408

Bajocien inferieur around Coly is particularly susceptible to underground river erosion (CAVES) (not sure what to do with this yet)

karstic system above 120/130m are no longer active (dry/dead) source LaDoux plays important role (not sure what to do with this yet)

**Archaeological Inferences**

The finds from this fluvial matrix were probably “displaced” from the abri deposits by the (Holocene) activities of the Vézère" p. 15-16 in reference to studies at Laugerie-Haute-Est (this is a conclusionary issue of studying archaeology of caves and rock shelters. It implies that an additional issue of disturbance for Paleo deposits but suggests that the same issues would not hold for later. Can attribute artifacts in front at later periods to cleaning, other water sources, or purposeful implacement. Is it possible to do a study of which caves/shelters would have been affected by this erosional activity?)

- human agency played a major role as an agent of alteration of depositions this is why it is important to understand the full geological history because it is useful to understanding Paleolithic deposits in terms of how LATER cultures (i.e. medieval) might have affected their visibility and spatial organization
- p.417 have not changed in size important for cave size comparison