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The Lorraine Grèzes Litées Deposits

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ABSTRACT

Grèzes (stratified deposits) are described from localities near Tilly-sur-Meuse and Domrémy-la-Pucelle. The sediments are derived from local bedrock. There is a lack of fines in the deposits, and slopewash is regarded as the most likely process of deposition.

RÉSUMÉ

Des dépôts stratifiés de grèzes litées sont décrits dans des sites voisins de Tilly-sur-Meuse et Domrémy-la-Pucelle. Les matériaux proviennent du substratum local. Il y a un déficit de fines dans ces formations et le ruissellement est considéré comme le processus de dépôt le plus probable.

KEY WORDS: Grèzes; stratified slope deposits; slopewash

LOCATION

Although one can find *grèzes litées* deposits on the Bajocian limestone (Lower and Upper Oolithic Limestone) and the Upper Oxfordian limestone, these deposits are mostly developed over Middle Oxfordian limestones. These are the least resistant of the Meuse valley limestones with regard to frost shattering. The *grèzes* are preferentially located on the east and the north-east oriented slopes of the valleys. These valleys cut the Meuse cuesta backslope (Figure 1).

The most important *grèzes* are located between Domrémy in the south and Verdun in the north, in the widest sections of the Meuse valley (Figures 2, 3). Here the valley is cut into the intercoral reef limestone facies. The deposits are sometimes located at the base of the valley slope, on the concave side of incised meanders (e.g. at Traveron). Such *grèzes* are mostly located on south-west to north-east oriented headlands (e.g. at Domrémy, Commercy, Tilly).

In the upper Meuse valley and on the Middle Oxfordian cuesta, the majority of the *grèzes litées* deposits are located on a rock step, formed by the Lower Oxfordian (Terrains à Chailles) stratigraphic surface (e.g. at Domrémy, Boucq). In the upper Meuse valley, the deposits are situated on the western valley slope, at nearly 50 m above the river. Downstream, at the Mosel-Meuse palaeo-confluence, the *grèzes litées* deposits are often located on a low fluvial terrace (e.g. at Domrémy, Commercy, Tilly).

MORPHOLOGIC ORGANIZATION AND SEDIMENTOLOGICAL FEATURES

One can find the deposits in east or north-east facing coalescent cones. In most *grèzes*, two formations have been observed (Figure 4). The lower is built of brown *grèzes* in which one can

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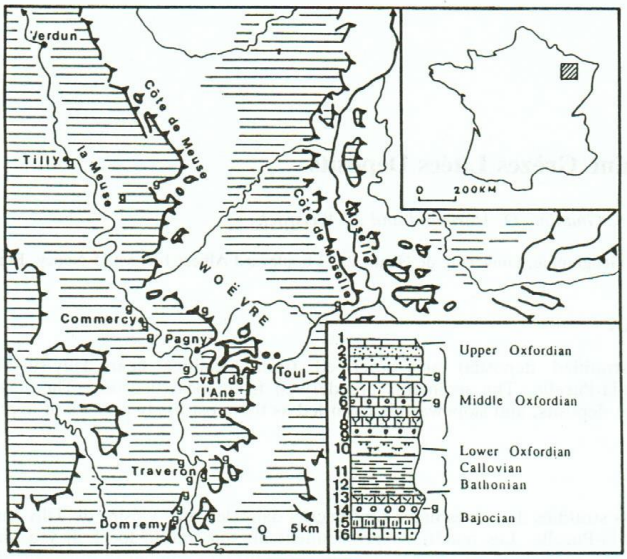

Figure 1 Location of the Lorraine *grèzes litées* deposits.

Legend to stratigraphic column:
1 limestones and clays
2 gravelly limestones
3 bioclastic limestones
4 sublithographic and chalky limestones
5 upper coral reef limestones
6 encrinic limestones
7 oolitic limestones
8 lower coral reef limestones
9 oolitic and ferrugineous limestone and *marne des Eparges*
10 siliceous limestone and clays, *terrain à chailles*
11 *argiles de la Woëvre* clays
12 oystered marls, *marne à huîtres*, and limestone, *caillasse à Anabacia*
13 coral reef limestone, *polypiers de Husson*
14 oolitic limestones, *oolithe miliaire supérieure et inférieure*
15 coral reef limestone and pseudo oolitic limestone, *oolithe cannabine*
16 oolitic, encrinic and sandy limestones

g: *grèzes litées* deposits and rock sources

find thick, calcareous indurated *grèzes* and several silt and clay beds. These beds are considered to represent reworked palaeosols. The lower, often well-layered, *grèzes* comprises the most important part of the deposits.

The upper formation consists of clearer, non-consolidated and discordant *grèzes*. These *grèzes*, which are, in fact, not well-layered in their upper parts, are thinner than the lower units. They are often more complicated. At Tilly, for example, three generations of *grèzes* have been observed. An intercone formation is interbedded between the lower and upper *grèzes*.

The coarse Lorraine *grèzes* are relatively well-graded sediments. Between 20% and 35% of the deposits consist of clasts between 3.15 and 5 mm in diameter. In contrast, diameters below 0.050 mm mostly comprise less than 10 per cent of the *grèzes* sediments. The *grèzes* are well layered, consisting of openwork or semi-openwork coarse beds and fine beds of matrix-supported or clast-supported gravels with a sandy matrix of pure sand (Domrémy, Commercy, Tilly).

GRÈZES DEPOSITION

The *grèzes* clasts and matrix are derived, for the

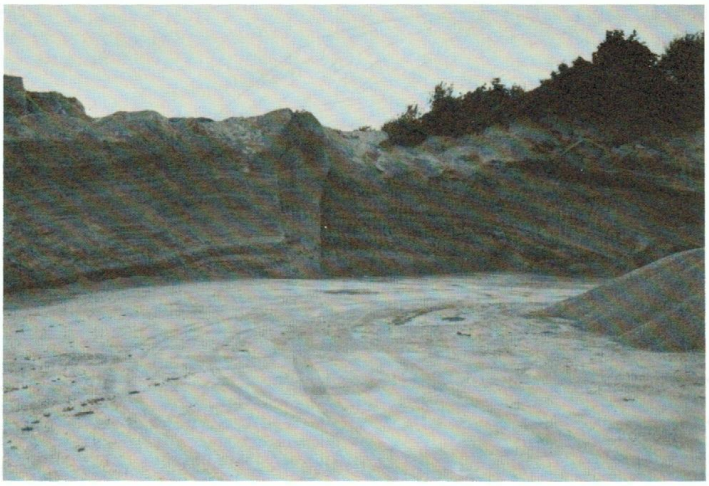

Figure 2 *Grèzes litées* deposits at Tilly-Sur-Meuse: cross-section showing main cone.

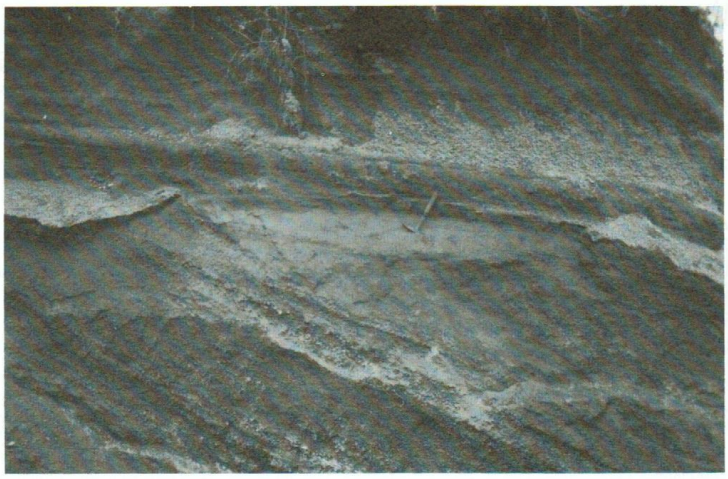

Figure 3 *Grèzes litées* deposits at Domrémy-la-Pucelle. Cross-section showing upper discordant *grèzes litées* formation with low dip on lower *grèzes litées* formation with strong dip.

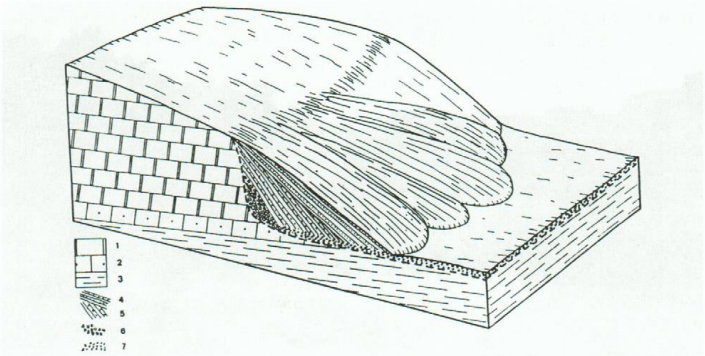

Figure 4 Morphologic organization of the Lorraine *grèzes litées* deposits.

Legend:
1 middle Oxfordian, sublithographic limestones
2 lower Oxfordian, siliceous limestones
3 marl of the *terrain à chailles*
4 upper *grèzes litées* formation with low dip
5 lower *grèzes litées* formation with strong dip
6 lower coarse head
7 unbedded slope deposits

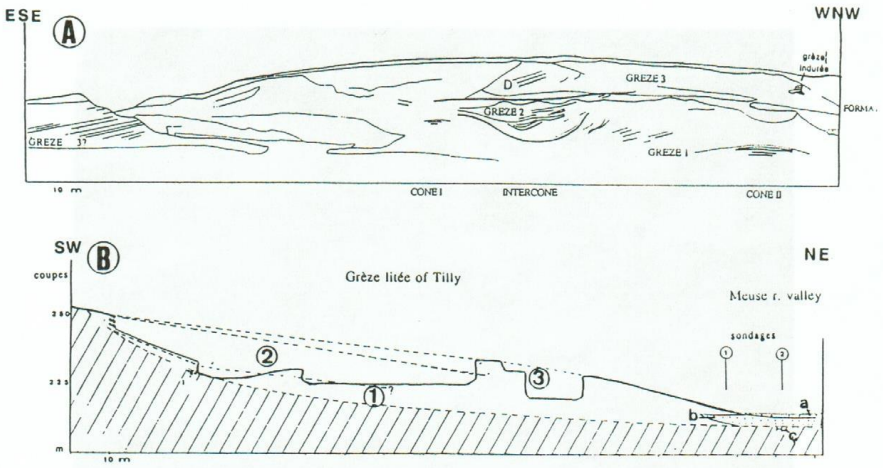

Figure 5 Morphologic organization of the *grèzes litées* deposits at Tilly-sur-Meuse: main cone with three formations (grèze 1, 2, 3). (A) Schematic cross-section showing *grèzes litées* deposits and associated facies. (B) Schematic profile of the *grèzes litées* main cone, the alluvial deposits of the Meuse River lower terrace and their interrelationships: (a) easily cryoclasted limestone (b) siliceous sands (c) colluvium.

most part, from the Middle Oxfordian lithofacies (Figure 5). The calcareous flakes, which form the most important part of the formation, come from the limestones, whereas the sand comes from Middle Oxfordian oolithic and encrinic limestones. The lack of marl in the limestone bedrock explains the low importance of silts and clays within the *grèzes*. Evidence for slopewash emphasizes the role played by meltwater. The lack of fines precludes the operation of solifluction sheet processes (*nappe-coulée*). The sedimentology is best explained by the hypothesis proposed by Journaux (1976).

The thickest and oldest *grèzes* are explained as indicating a far longer period of formation and perhaps a more humid climate during deposition. Since the oldest *grèzes* either occur on a Meuse alluvial formation and predate the Mosel piracy, or are interbedded with the siliceous sands of these alluvial sediments, the oldest *grèzes* must represent the Saalian period. Therefore, the most recent and thinnest *grèzes* represent the Weichselian period.

REFERENCE

Journaux, A. (1976). Les grèzes litées du Châtillonnais. *Bulletin de l'Association française pour l'étude du Quaternaire*, **3–4**, 123–138.