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► To cite this version:

Dave Geerts, Kai Fechner, Eckhart Heunks, Bart Vanmontfort. A Late Glacial paleosol at Lommel Molse Nete. Variability and diagnostic features. Inrap; UMR CITERES-LAT. Lire le sol en archéologie: pratiques de terrain et regards croisés / Reading the soil in archaeology: field practice and interdisciplinary perspectives, Nov 2023, Tours, France. 2023, 10.34692/mjmy-0h40 . hal-04350792

HAL Id: hal-04350792

<https://inrap.hal.science/hal-04350792v1>

Submitted on 18 Dec 2023

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A Late Glacial palaeosol at Lommel *Molse Nete* Variability and diagnostic features

Between 2019 and 2021 an extensive landscape and archaeological survey was conducted in a 240 ha large area north of the Molse Nete valley in Lommel (Belgium). The study area is located on a height of ~50 meter a.s.l. on the western edge of the Campine Plateau. This plateau is a classic example of relief inversion, being covered with coarse alluvial deposits of the Early to Middle Pleistocene Meuse and Rhine and overlooking the wider, 30 to 40m lower lying area (Beerten *et al.* 2018). Coversands were deposited on top of these gravels during the Late Pleistocene.

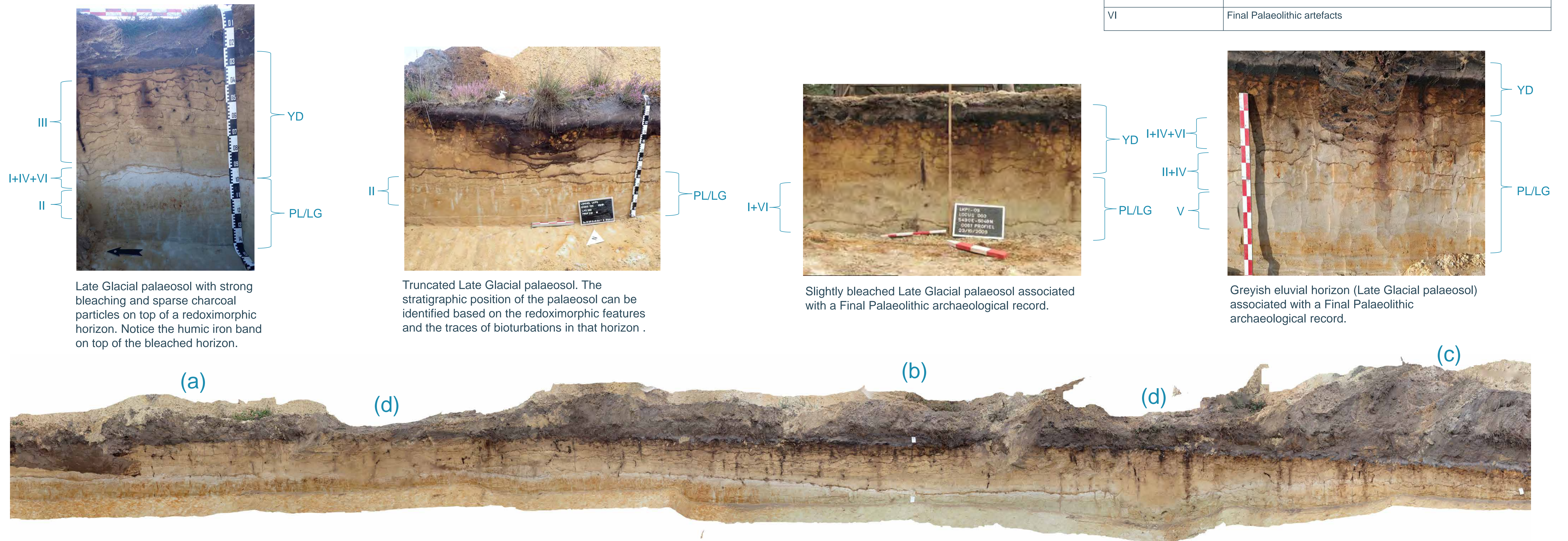
The survey was conducted by means of mechanical and manual augerings, testpitting and profile trenching (Vanmontfort *et al.* 2022). A bleached horizon, often containing charcoal particles, was observed at the top of Pleniglacial and early Late Glacial coversands. In an earlier stage, an association with a Final Palaeolithic archaeological record had been identified (Van Neste *et al.* 2009). Based on the characteristics of this horizon and its lithostratigraphic position, it can be interpreted as a Late Glacial palaeosol, most probably connected with the Allerød interstadial and thus an equivalent of the Usselo soil (*cf.* Kaiser *et al.* 2009). One of the goals of the survey was identifying and mapping the extent of this palaeosol. Its presence was confirmed in an area covering c. 23 ha.

Within that area, the appearance of the palaeosol is highly variable. Charcoal particles are not always present, and the bleached horizon can be less pronounced or even barely visible. Also in the latter cases, an association with a buried archaeological record has been observed. In the disturbed soil samples of an Edelman auger the identification of this variable palaeosol is challenging. It is advised that whenever a palaeosol can be present, landscape surveys by means of manual augerings are always complemented with profile observations in testpits or trenches and a full description of the Quaternary stratigraphy, even if prior augering was not able to identify a clear Late Glacial palaeosol. In order to reconstruct the palaeoenvironments and their evolution, the individual diagnostic features are to be distinguished and put in a sequence. This is being done as far as possible in the field (e.g. humic bands against iron precipitation) and is still to be confirmed and completed by thin sections and analytical data.

Legend

YD	Younger Dryas coversands	Fine (90-180µm) well sorted, structureless, rather loose, aeolian sands. Podzolisation on the top with irregular oval bacterial casts. Humic bands throughout the unit.
PL/LG	Pleniglacial and/or Late Glacial coversands	Fine to medium (125-335µm) well to average sorted, structureless, rather compact, (niveo)aeolian sands. Towards the bottom of the unit parallel to wavy layering occurs, with more silty sandy laminae. At the top a bleached horizon and/or redoximorphic features with small circular beetle casts may occur. Humic iron precipitated bands occur near the top. Lithic artefacts are associated with the top of this unit.

I	Buried bleached horizon, Late Glacial palaeosol
II	Redoximorphic features
III	Humic bands
IV	Humic iron bands
V	Bleached horizon, origin under discussion
VI	Final Palaeolithic artefacts



Late Glacial palaeosol with strong bleaching and sparse charcoal particles on top of a redoximorphic horizon. Notice the humic iron band on top of the bleached horizon.

Truncated Late Glacial palaeosol. The stratigraphic position of the palaeosol can be identified based on the redoximorphic features and the traces of bioturbations in that horizon.

Slightly bleached Late Glacial palaeosol associated with a Final Palaeolithic archaeological record.

Greyish eluvial horizon (Late Glacial palaeosol) associated with a Final Palaeolithic archaeological record.

Late Glacial palaeosol variation in a horizontal and vertical dimension. (a) To the left of the profile, a strongly developed redoximorphic horizon is present below the clear bleached horizon. (b) In the center a (palaeo)depression is present, where a reduced horizon is visible underneath the bleached horizon. (c) To the right the bleached horizon is less well developed, but still present. (d) At several locations natural features cut through the Younger Dryas cover sands and the Late Glacial Palaeosol. Trench length 29m, profile height 0.9 to 1.76m.