# Loess Soil – Soil of the Year 2021

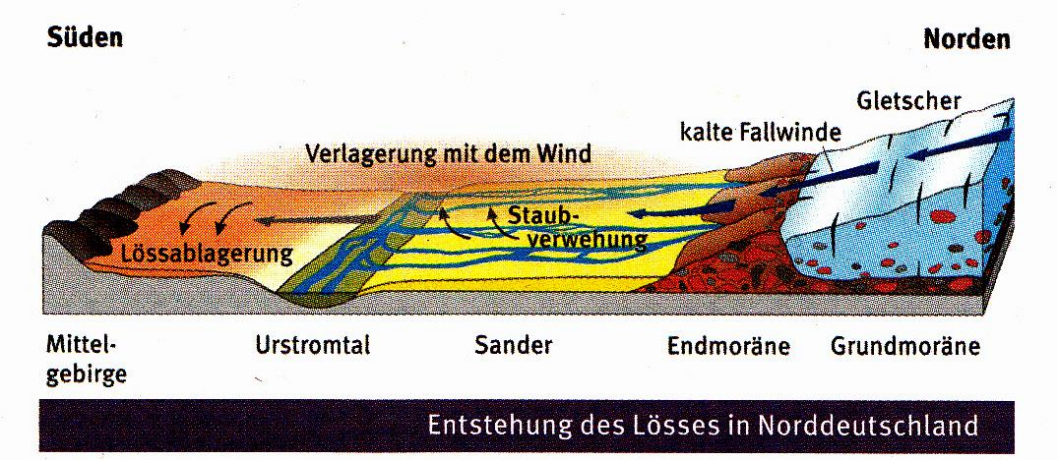
**Authors:**
Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) Hannover in cooperation with the curatorship Soil of the Year. The Soil of the Year 2021 is under the auspices of the Bundesministerium für Wirtschaft und Energie

Translation: E. Eberhardt, S. Stadler. BGR

A soil of high diversity (© BGR)

- **Loess – dusty gold**

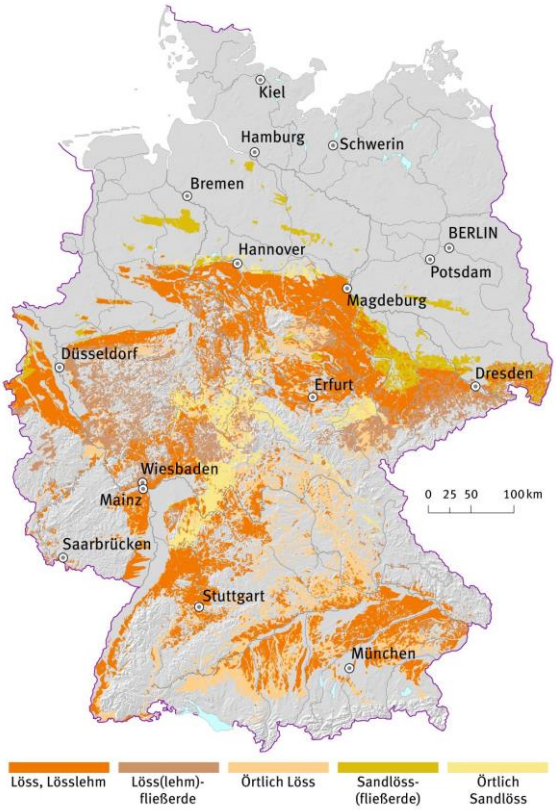
Why is loess so special? What are the reasons for loess soils to become so fertile and hence turns them into true natural treasures? How can we preserve loess soils and use them sustainably?
Loess is a predominantly calcareous, homogeneous, pale yellowish sediment that mainly consists of silt-size particles. Silt is finer than sand, but coarser than clay and hence similar to dust. The term loess most probably originates from the Alemannic (Swiss-German dialect) expression *Lösch* “loose”.




South, North, displacement by wind, cold katabatic winds, glaciers, Central Uplands, glacial valley, outwash plain, terminal moraine, ground moraine (© BGR)

- **Child of the ice age**

Most of the loess formed during the last ice age between 115 000 to 13 000 years before present. Much of Germany was a cold, tree-less steppe environment, into which glaciers extended from north and south. Glaciers and frost broke down rocks and stones and ground them into mineral dust. The latter was lifted into the air and deposited miles away from the source areas, often on the leeward sides of hills.
In Northern Germany, this occurred along a northern fringe of the Central Uplands, today‘s „Börden“ (fertile flatlands) with the Jülich-Zülpicher Börde in the West via the Magdeburger Börde up to the Leipzig Basin and the Saxonian Hills to the East.
In Southern Germany loess was deposited in areas north of the gravel plains of the Alpine rivers, in the Upper Rhine Valley and in the Central Uplands in the wide valleys and basins (map:BGR)



- **Diversity emerges**

Remains of plants form humus that is deeply mixed into loess by soil organisms. When cold winters and summer dryness hamper humus degradation, Chernozems form. In places where the finest particles of soils – clay particles – are translocated with seepage water into the subsoil, Luvisols form. If topsoil is bleached in this process, Haplic Retisols develop. If seepage water accumulates on top of clay-rich subsoil, Stagnosols and Planosols emerge. The formation of all those soils always starts with a displacement of carbonate deeply into the still unweathered loess. In this process, centimeter-long, rigid concretions may form – the loess dolls.

Chernozem (© BGR)

Luvisol (© BGR)

Haplic Retisol (© BGR)

- **First choice**

Easy cultivation and fertile soils have always attracted settlers. In former times such soils were already used for agricultural purposes. This is also known from archeological finds of tools and artifacts from the early Bronze Age, like the Nebra Sky Disc.

The high yield of soils was able to supply many people and thereby contributed to the development of cities. Many cities today are located in or in the vicinity of loess regions (e.g. Cologne, Magdeburg, Stuttgart). Whenever new construction takes place, precious soil is lost.

Loess landscape (© BGR)

- **A knight in shining armor**

Loess soil is free of stones and very porous. The space between silt particles is just big enough for the loess soil to store and provide water for plant usage and at the same time to be sufficiently conductive. Water may ascend within the soil like within filter paper when plants take up water, and when the rooting area is drier than the root-free zone below. With this, the plant's hydric stress during droughts is reduced and the yield increases.

The most water-demanding crops such as sugar beets and potatoes are therefore preferably cultivated on loess soils (© BGR)

In addition, the rare forest stands on loess profit from a good water supply.
Aside from water, loess soil also stores nutrients and contaminants. These can easily adsorb onto the large surface area of the fine soil particles. In this way, nutrients are available for plants (infiltration test: BGR)

At the same time, harmful substances may be retained in the soil, which leads to a protection of our groundwater. In order not to overstress the soil and its filter capacity, the infiltrated substances have to be biodegradable. Degradation is performed by microorganisms. Their high activity level in loess soils contributes to a rapid turnover of undesired substances.

- **A sensitive soul**

With all these advantages: such a loess soil is highly sensitive. The material was supplied by the wind, and may as well be (re-)taken away with it – or be easily washed away by water.

Water erosion /Gully erosion (© BGR)

Wind erosion (© Hoffmann)

As loess may not be formed without a new ice age, we need to conserve it. The best protection against erosion is a year-round vegetation cover and as many hedges and trees as possible.

Conservation tillage to sugar beets (© Frielinghaus)

Systems of hedges against wind erosion (© Frielinghaus)

But what can we do if something is lying under the precious soil that we also want to exploit, such as lignite in many places? If after lignite mining the previously removed loess is reapplied with a sophisticated method, we can succeed in regaining vast landscapes for usage.
On these recultivated areas soils redevelop and fulfill important functions for the ecosystem and landscape hydrology. Loess soil is worth it – because of its excellent features and manifold functions, as a soil it is a **true jack of all trades**

**Further information provided by**

Bundesanstalt für Geowissenschaften und Rohstoffe
Dietmar Krug, E-Mail: BdJ2021@bgr.de
Dr. Ralf Klingbeil, E-Mail: BdJ2021@bgr.de

Website Soil of the Year / www.boden-des-jahres.de
Deutsche Bodenkundliche Gesellschaft / www.dbges.de
Bundesverband Boden / www.bvboden.de
Ingenieurtechnischer Verband für Altlastenmanagement und Flächenrecycling e.V. / www.itv-altlasten.de
www.bodenwelten.de

**Information materials (Poster and Flyer)**

Umweltbundesamt, www.umweltbundesamt.de/publikationen

**Impressum**

Common campaign of the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) Hannover
and the Kuratorium Boden des Jahres (Deutsche Bodenkundliche Gesellschaft, Bundesverband Boden,
Ingenieurtechnischer Verband für Altlastenmanagement und Flächenrecycling e.V.) and the Umweltbundesamt.