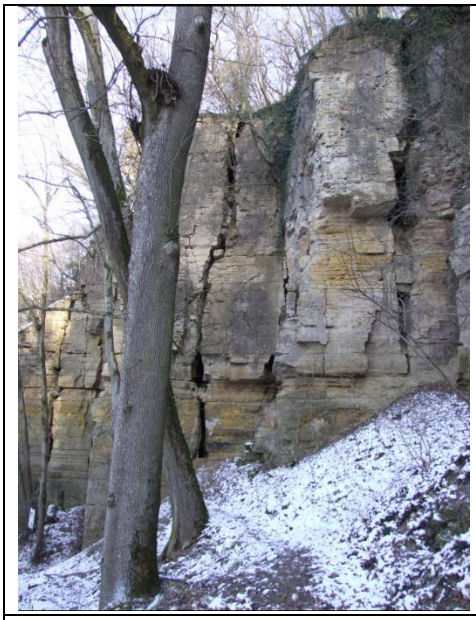
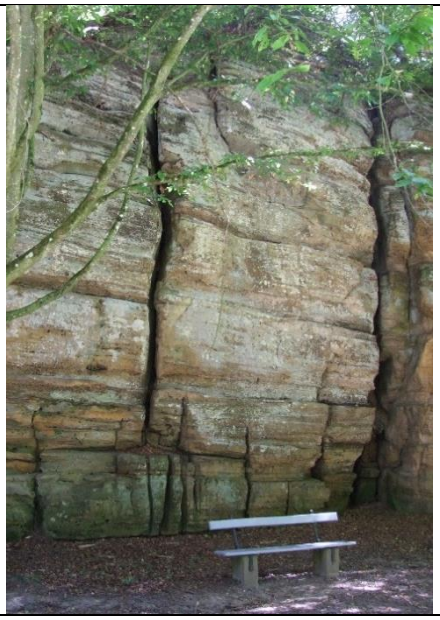
Groundwater

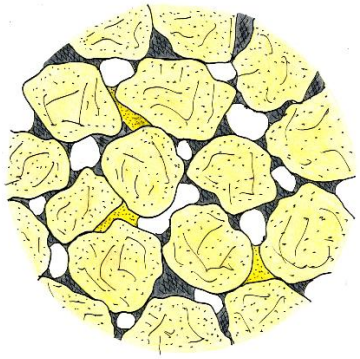
Underground rocks play an important role in the water cycle. They can store and release water.
In how far a rock is able to store water and release it again is influenced by the number and size of the pores it contains, that is, the gaps between the mineral grains that form the rock. In the Mëllerdall region, pores can be found in sandstones, marls, claystone, and in all loose rocks. They can be filled with air or with water. The pores between the sand grains of a sandstone are relatively big, while the pores in marl or claystone are very small. Consequently, water seeps relatively quickly through sandstone, while it moves much slower through claystone. Water can also move through joints, deep vertical cracks between rocks. Within the region, these joints not only slice through porous sandstones from top to bottom, but also through the non-porous dolomites and limestones.



Joints in dolomite



Joints in sandstone



Pores in sandstone, between quartz grains and a calcium carbonate (gray) or silicate (yellow) cement (illustrative diagram)

When it rains, the precipitation seeps downwards through the pores or the joints. In those places where a rock with low water permeability lies beneath a rock with high permeability, the water accumulates and fills up all pores and joints. This is how groundwater is formed. Within these pores and in sand-filled joints the water is filtered, that is, it is cleared of all suspended particles. However, dissolved substances like salts or pesticides cannot be filtered out of the water in this way. Empty joints not filled with sand are typical for the non-porous dolomites and limestones. They do not filter the water. The water that runs through them comes out at the bottom in the same state it went in.

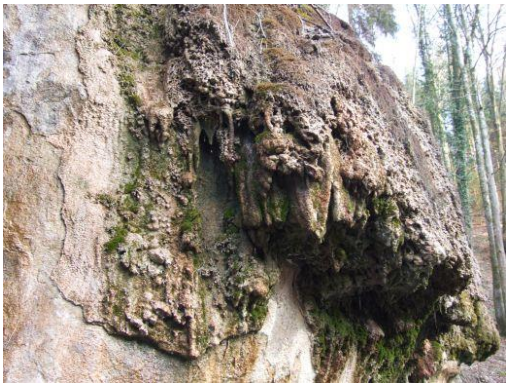
Groundwater emerges at the transition from marl, a rock with low water permeability, to sandstone, a rock with very good permeability and many joints (Photo: excavation at a construction site in the Natur- & UNESCO Global Geopark, SGL).

As groundwater makes its way through a rock, it takes up some of the dissolvable carbonates (calcium carbonate and dolomite) from the rock. Over time, pure limestone and dolomite can be completely dissolved in this way. In the Luxembourg Sandstone, the water dissolves the calcium carbonate that acts as the cement between quartz grains. When this calcium carbonate enriched water emerges at a spring, the calcium carbonate can precipitate out of solution due to evaporation or other processes. This still happens today. It then forms calcareous tufa, the youngest solid rocks in the region.

Calcareous tufa…

... deposited as a thin layer on a piece of wood

... as a rock grown over time



... as a deposit on top of a cliff (Geosite Kallektuffquell).

In nature, groundwater often emerges at rather inconspicuous springs. For example, one can spot one in places where there are wet leaves. Sometimes, a small rivulet will emerge from it as well. The many spring boxes in the Natur- & UNESCO Global Geopark illustrate how important groundwater is for the local drinking water supply. In valleys one can often spot installations built to obtain drinking water. They are built in places where sandstone gives way to marl. Marl can also be found beneath dolomite, where it causes water to accumulate within the joints piercing the dolomite. This groundwater is also fed into the local drinking water supply. Protected areas are demarcated around springs to protect the drinking water from pollution. This way the region is almost self-sufficient in its drinking water supply.

A spring left in its natural state at the bottom of a layer of Luxembourg Sandstone (Geosite Wanterbaach-Siweschlëff).

A spring encased in a spring box in order to obtain drinking water (Photo: SGL).

Something special happens in the valley of the river Sauer in the vicinity of Rosport: there, carbon dioxide emerges from deep underground. It is a remnant of the volcanic activity in the Eifel and has migrated through joints in the rocks all the way to this place. The carbon dioxide is dissolved in water, and therefore sparkling mineral water comes to the surface at this spring.
In Born, also in the Sauer valley, something else noteworthy happens: Here, it is saltwater emerging from sandstone layers that date to the Buntsandstein (born sandstone). In the 16th to 18th centuries, it was used to obtain salt.

Birgit Kausch, 2020