The karst bauxite of the Unterlaussa mining area (Upper Austria)

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Four of the six once existing mining fields close to the abandoned miners´ village Weißwasser northwest of Unterlaussa (Upper Austria) are still accessible by underground openings. They operated on boehmitic karst bauxite lenses at the base of the Gosau succession of the basin "Weyerer Bögen".

Twenty-three samples of bauxites and bauxite-related sediments were analysed by means of ICP-MS and XRF. The geochemical samples also include those of four bauxite profiles. In addition SEM, electron microprobe and XRD were used to define the mineralogy and to map element distributions. The XRD analyses revealed that the bauxite-related sediments are not repositioned bauxites but rather immature (not bauxitisized) sediments of which some are probably mineralogically similar to the parent material of the karst bauxite.

In the longest and best-preserved bauxite profile (Almstollen) the REEs (except for Sc and Ce) distinctively accumulated in the lowermost two meters of this six-meter-long profile. Rare earth elements are generally highly enriched compared to average crustal values. However, also other trace elements could be detected in high concentrations. Chondrite-normalized REE patterns of the Almstollen profile indicate reducing conditions in the lowermost two meters of the bauxite body due to negative Ce anomalies. The upward following samples show clear positive anomalies pointing to oxidising conditions.

The karst bauxite of the Unterlaussa mining area can be regarded as an Upper Cretaceous (Turonian) paleosol which was formed in-situ by tropical to subtropical weathering of a precursor sediment on karstified dolostone. This precursor sediment was presumably illite-rich and likely already contained kaolinite. Lateritic material as well as volcanogenic sediments were probable contributors to the parent sediment. Additionally ultrabasic rocks must be assumed in the catchment area of this sediment as chromite and chromium accumulations prove. Conclusively the precursor material can be described as a mixed, fine-grained, polygenetic sediment.

Changing conditions of water saturation are responsible for the layered in-situ concretions (spheroids) which give the bauxite its characteristic pisolitic texture.

The karst bauxite of Unterlaussa was partly resilificated, deferrificated (bleached) and pyritized. Both of the latter processes are attributed to microbial activity. Moreover a presumably microbially mediated uranium mineralisation and a massive aluminium-hydroxide bound chromium mineralisation have been identified.