GEOCHEMICAL AND MINERALOGICAL „FINGERPRINTS" OF HISTORICAL BRICKS FROM AUSTRIA

Ottner F.[1)], Fröschl H.[2)], Zeitlhofer H.[3)]

[1)] Institute of Applied Geology, University of Natural Resources and Applied Live Sciences, Vienna, Peter Jordan Strasse 70, 1190 Vienna, Austria
[2)] Seibersdorf Labor GmbH, A-2444 Seibersdorf, Austria
[3)] Department of Geodynamics and Sedimentology, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria

Clays and sediments rich in clay are used as typical raw materials for the brick industry. Austria has an old tradition in the production and usage of bricks. The oldest known bricks in Austria were probably produced by Romans about 1800 years ago in order to have enough construction material to fortify military camps close to the Danube River. After the collapse of the Western Roman Empire the knowledge about brick production in Central Europe, as well as in Austria, was lost. Not until medieval times, when huge amounts of building materials were needed for the construction and preservation of the Vienna town walls, the fabrication of bricks was rediscovered. At last, the urban expansion of Vienna in the 19th century leads to the self-evident usage of bricks as we know today.

The present work aims to trace the origin and age of historical bricks in Austria. Therefore, the importance and significance of different parameters like chemistry, mineralogy and production technologies have to be proofed by archeometric methods. Mineralogical and petrographical parameters as well as technological properties were determined by analysing ~100 historical brick samples from different parts of Austria. Elemental analyses were performed on total digestions of the powdered materials using inductively coupled plasma mass spectrometry (ICP-MS) for the determination of the trace element composition of the samples.

The natural elemental distributions of bricks reflect the geochemical and also the geological environment of the used raw material, and therefore can be consulted as "fingerprint" to differ brick samples. Initial REE determinations showed significant patterns for brick samples of different provenances. Furthermore, element ratios like Sr/U, Ni/As, Ca/Sr and Ni/Ti gave individual scatter-plots for the particular origin of the brick sample.

Macroscopical and petrographical observations predominantly give information about technological processes during brick fabrication. Brick signs, the symbols of the producers, sometimes are available and can help identifying the brick origin. Additionally, fragment inclusions of the bricks like aggregations, rock-fragments or recycling-fragments, can be used for the detection of the production facility.