

deciphered by an integration of information through analysing patterns in the dinoflagellates (lake surface) and ostracods (lake bottom) with pollen data (shore and hinterland). Different processes within the lake will be compared to vegetational dynamics to reveal potential linkages and feedback mechanisms between both.

FWF-Projekt P 21414-B16: Millennial- to centennial-scale vegetation dynamics and surface water productivity during the Late Miocene in and around Lake Pannon.

### **Interdisciplinary archaeometric research on early-medieval pottery from Nikitsch (Burgenland)**

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Interdisciplinary archaeometrical research has become more and more important over the last years. Motivated by a thorough study of the Lombards in Burgenland, Lombard sherds from Nikitsch (Burgenland) were analyzed in order to reveal raw material origin and manufacturing technology. As the Amber Road, a trading route passing through the Burgenland on its way from the north to the south, already started to form in late Neolithic and persisted for about 7000 years, it neither can automatically be assumed that local material was used for pottery production nor that the pottery itself was of local origin. Exactly these questions, origin and applied technologies during the manufacturing of goods, are at the very core of archeology, but can unfortunately rarely be answered with the methods of classical archeology. Archaeometry though provides advanced tools to tackle questions concerning the used raw-materials and thus can give ideas about provenance and technology. To provide a basis of reference, sherd samples from a time period of roughly 6500 years were analyzed, dating from the early Neolithic to the Migration period. Six sherds were analyzed, five of them were found in Nikitsch. Of those five samples, two are dated to be Lombard and three are Prehistoric ranging from Neolithic (Linear band pottery) over Copper Age (Badener Culture) to the Iron Ages (Kalenderberg Culture). As reference specimen for typical Lombard techniques, a distinct Lombard sherd from Steinbrunn (Burgenland) was analyzed.

The applied methods were petrography, x-ray diffraction and electron-probe microanalysis.

The main mineralogy assemblage of all analyzed samples is virtually identical, with quartz, K-feldspar, plagioclase and muscovite as the main minerals. The minor mineral fraction comprises epidote, biotite and chlorite. This observation and the fact that the sherds span several thousands of years suggests the material is of local origin, although this specific makeup is common enough to prevent a definite pinpointing of a single sand pit. This result fits well into the archaeological classification of the sherds. The Kalenderberg sherd for example is a regional

group of the Hallstatt-Culture and is not as widespread as e.g., Roman pottery.

Evaluating the technology of the studied findings it can unsurprisingly be seen that the quality of the used materials, the methods of raw-material preparation respectively tended to increase over time, with the exception of one sherd likely produced by the Lombards, which features quartz of uncharacteristically large size. The Neolithic sherd was analyzed showing well aligned micas, which indicates that it has been created on a potter's wheel.

Intentional tempering reflects a technology that also gradually changed over time: The Neolithic pottery does not contain temper material like grog, which is commonly used to improve the physical properties of sherds during drying and firing. The analyzed pottery from Badener Culture and Kalenderberg Culture contained large quantities of rock fragments and grog, indicating a well-controlled usage of different temper materials. Compared to these sherds, or roman pottery for that matter, the Lombard's tended to be finer in grainsize but without any temper material. Especially one Lombard sherd features a grainsize small enough to imply that the raw material has been sieved or levigated.

Assessed from oxidized mineral phases and sherd color, all sherds but one have been fired in an oxidizing atmosphere, which is usually easier to maintain than reducing firing; firing temperatures for all sherds were estimated to be below 600 °C. This observation is based on textural and mineral-chemical evidence.

Even though it was not possible to discover typical Lombard manufacturing techniques or to prove beyond doubt that the raw material provenance is in the vicinity of Nikitsch, this work presents a good basis for further archaeometrical research in Burgenland. Comprehensive analyses of sand pits in this region are not yet available, making the pinpointing of specific sources for the used materials impossible. Further research and analytical work is required here to build a database of local materials with which pottery findings can be compared.

### **Unterschiede in Modellergebnissen von Grundwasserneubildung und Nitrataustrag bei unterschiedlicher Verwendung gleicher Landnutzungs-Inputdaten**

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Qualität und Quantität von Grundwasser (GW) wird von verschiedenen Faktoren beeinflusst. Vor allem die Anwendung von stickstoffhaltigen Düngemitteln in landwirtschaftlich genutzten Regionen führt oft zu einer Gefährdung des GWs durch Nitrat. Diese Gebiete, wie z. B. das Grazer Feld, das Leibnitzer Feld oder das Untere Murtal, beinhalten auch sehr große Trinkwasserreserven, welche sowohl zur regionalen, als auch zur überregionalen Wasserversorgung verwendet werden. Daher ist die langfristi-