

## **Archaeometry of Sabaeen pottery from the Almaqah temple in Sirwah/Northern Yemen.**

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The Almaqah temple is situated inside the city of Sirwah, part of the ancient Sabaeen kingdom in South Arabia, now 80 km east of the Yemen capital Sana'a. Excavations conducted by the DAI started in 1992 and were intensified since 2001. Numerous pottery samples has been collected. 16 of them were selected for first geoarchaeometrical analyses with the aim to classify them reconstructing firing conditions and distinguish imports from local material. The samples are fragments of several cm in size. They are fine to coarse grained with different colours (red to black).

Petrophysical methods measured the density and porosity of the samples. Thin sections were made by impregnating the samples with epoxy resin, cut them perpendicular to the surface and gluing it on 5 x 5 cm glass plates. Cathodoluminescence was made with the thin sections under Helium atmosphere. The samples were placed in a vacuum chamber and luminescence was caused by a electron beam of about 15 KV. SEM analyses were done to complete the analytics by displaying the matrix morphology (clay minerals) and the pore space.

The results show that different sands were used as additive, mostly consisting of badly rounded quartz grains and feldspars. Some sands contain glimmer and re-crystallized carbonates. Rare are pure and fine grained quartz sands. Further additives are steatite, lapilli coming from volcanic fields and other pottery pieces. Organic material can be proved by the form of the pore space which suggests straminous material as additional additive. The samples show different colours under luminescence. Especially the colour of the quartz grains range from blue to brownish and suggest different sources of the sands.

For the distinction between local and imported material a firing test was conducted. Local material of the Sirwah oasis was mixed with typical additive material and fired at temperatures between 600 and 1200° C, under oxidizing and reducing conditions. A first comparison with ancient samples suggests firing temperatures between 900 and 1000° C. Some minerals of the additives seem to be useful temperature indicators. Beside lime grains the steatite shows different colours due to temperature. Further investigations will be XRD analyses to detect mineralogical differences and trace element geochemistry.

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