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Kamiltepe in the Mil plain (Azerbaijan): mineralogical studies

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The Mil plain is located on the bank of the Aras river in Azerbaijan formed by a bottomland of the two rivers Kura and Aras. The area is settled since the Neolithic age [1]. Archeological investigations in the Mil plain started in the 1950s with the excavation of numerous kurgans. Nowadays research focuses on mud bricks settlements, the main site is Kamiltepe, dating back to 5600 to 5400 BC [1].
The mineralogical studies are related to ceramic shards and the clay deposits close to Kamiltepe. Ceramics from Kamiltepe are made from clay with organic temper, temper of mineralogical origin was not observed [1]. This counts for the use of a relativ pure clay from a nearby, nowadays fallen dry river bed [1]. The aim of the mineralogical studies was to try to answer the question, if the nearby clay deposits can be related to the ceramic shards.
The investigation of the soil profiles was driven mainly be the question on the occurrence of clay deposits nearby the settlements, maybe within the nowadays fallen dry river beds. In order to get an insight into the geological relations of the Kamiltepe region 53 drills with up to 6 m deepness were performed. Mineralogical analyses have been performed on clay samples from different drillings as well as on pottery fragments using electron microprobe analysis (EMPA) and X-ray diffraction (XRD).
From the EMPA results it can be concluded, that the mineral content concerning feldspar minerals of the clay samples from the drillings are fairly close to that of the pottery studied. It could be an idication, that they have the same origin. The XRD pattern of the clay samples from the drillings confirmed quartz and calcite to be the most important non-clay mineral associated with the feldspar (andesine). Concerning the clay mineral content, the occurrence of illite and kaolinite could be verified. The XRD pattern of the pottery samples confirmed quartz in all samples studied, as well as the absence of calcite or only a small amount of calcite. But the diffraction peaks of a calcium-alumosillikate occurs (Wollastonite). This indicates the reaction of calcite and the clay minerals during the firing process. In order to reconstruct the firing process, small cubes were formed using a clay sample from the drillings and treated at different temperatures (100°C – 800°C) in air in a furnace. The fired samples were investigated by X-ray diffraction. The XRD pattern confirmed that calcite is present till a firing temperature of 700°C. This indicates, that the reaction of calcite with the clay minerals to form alumosilicates takes place between 700°C and 800°C.
[1] T. Aliyev, B. Helwing, Archäologische Mitteilungen aus Iran und Turan 41 (2009)