



Determining the source of raw material for ceramics from the Settlement Urdoviza, Kiten, Bulgaria

Определяне на източника на суровината за керамичните изделия от селище Урдовиза, гр. Китен, България

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One of the most important problems to solve during investigations of archeological objects is the determination of the source of the raw material (clays for ceramic dishes or ores for metallurgic finds). For answering this question we compare ceramic fragments from settlement of Urdoviza with clays from different deposits close to the sea beach using XRF analyses (done in Sofia University) for the main elements and LA-ICP-MS analyses (in Geological institute of BAS) for the REE. The texture and the added “improve” material in ceramic fragments were determined using thin sections.

The Early Bronze Age settlement is in the southern bay of Urdoviza peninsula – in the present-day town of Kiten. The settlement is now found underwater. The remains in Kiten are from 5–6 m to 8–10 m under the modern sea level. According to recent studies, the site was on the ground away from the seashore and near the riverbank of Karaagach River. A rise in the sea level sunk their remains on the seabed. Transgressions and regressions are common for the sea-level and differ in their intensity depending on the climate change and local movement of the littoral zone. The settlement is discovered in 1986 during the excavation of a shipwreck in the southern bay near cape Urdoviza. The researchers unearthed Early Bronze Age ceramic sheds and wooden piles. A special expedition started, called Urdoviza whose main purpose was examining the settlement. It lasted for four seasons – 1986, 1987, 1988 and 1989. It is worthy to note that each season the location of the excavations changed, and some ‘horizontal’ stratigraphy could be detected.

A lot of artefacts were discovered during the expeditions. Some metal finds and utensils for metal work show that metallurgy was practiced on the site. There is a great quantity of bone tools, some figurines and other small finds. However, the main items found there are the pottery sheds. The four seasons from Urdoviza provided one of the biggest collections of Early Bronze Age vessels found underwater.

The investigated ceramic fragments are from different type of archeological objects. Typical for them is the big amount of “improve” material (up to 40 %). It is presented by mineral fragments (quartz, plagioclase, microcline, clinopyroxene) or small (sometimes visible with nicked eyes) rock fragments (dolerite, andesite). No orientation of the fragments was observed as result of rotation during vessel’s preparation. This is probably due to the cutting of the thin sections perpendicular to the vessel’s walls.

The clays are collected from the southern part of Urdoviza peninsula and are probably of Neogene age (Galata Formation). They are gray to dark gray in color with pelitic grain size containing rare coarse grained lithic fragments. On the discrimination diagrams Th/Sc, La/Th, (K₂O/Na₂O)/SiO₂ and La-Th-Sc (Cullers, 1994) the clays are classified as rocks deposited at continental margin conditions from mixed source with domination of metabasic source (Fig. 1a). This is in good agreement with the widespread distribution of andesitic rocks and tuffs in the area of the town of Kiten (Petrova et al., 1992) which are covered by the rocks of Galata Formation (limestones, clays and sandstones).

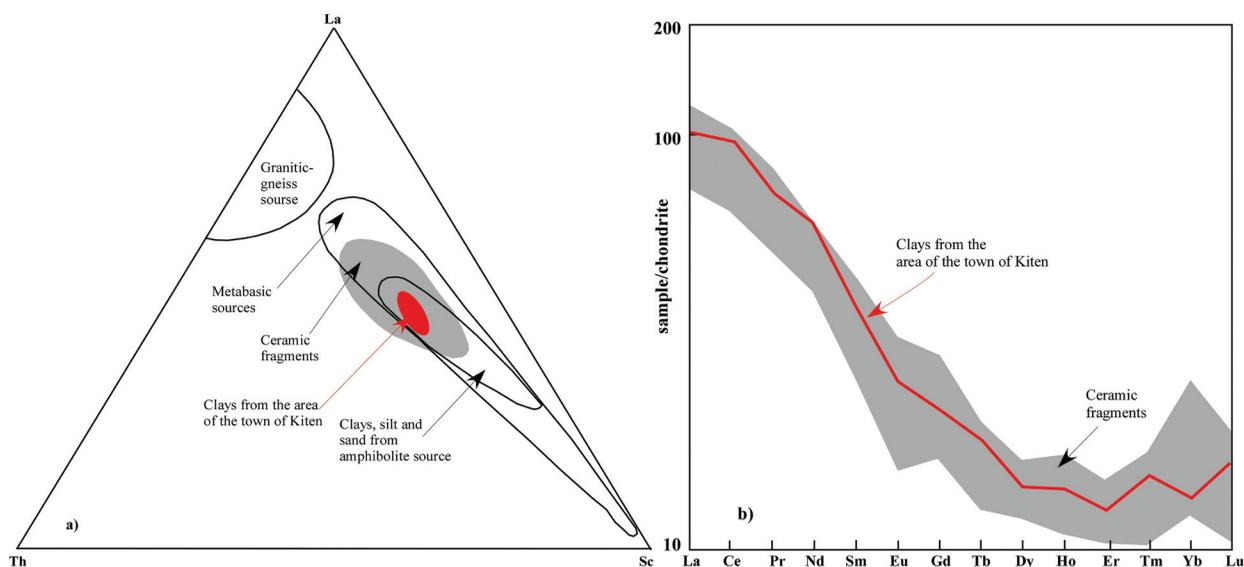


Fig. 1. *a*, La-Th-Sc diagram for discrimination the source material for clast sediments; *b*, REE distribution in clays from the area of the town of Kiten and in ceramic fragments from Urdoviza settlement

When comparing the chemical composition of the possible source clays with ceramics we must take into account that the added “improve” material can influence and change it in the ceramics. Nevertheless, this method provides reliable information for answering the question about the source of the raw material for ceramic production. On the AFM diagram the clays plot close to the fields of NASC and Average Shale Compositions (ASC) while the composition of ceramic fragments shows variations related to the added material. The clays and the investigated fragments have similar contents of Ba, Sr and Rb and on the binary diagrams Ba vs Rb and Sr they form one field.

The Zr and Hf contents in clays are related to the amount of terrigenous accessory minerals in them and they depend strongly from the source province. It is positive correlation between both elements and it makes it good criteria for comparison of different objects. This type of correlation is determined in the investigated objects, too. Both clays and fragments form a common field on the Zr-Hf diagram.

The REE distribution patterns of the clays are very similar to these of the fragments (Fig. 1b). They show strongly depletion of HREE (La/Lu=51–86) and rare shallow negative Eu anomaly (normalized after Haskin et al., 1968).

The petrographical and geochemical investigations of the clays from the area of the town of Kiten and ceramic fragments from the settlement Urdoviza show clearly expressed similarities (part of them demonstrated on Fig. 1a, b). This allows us to conclude that the source raw material for ceramic production in settlement Urdoviza are the clays cropping up close to the town of Kiten.

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