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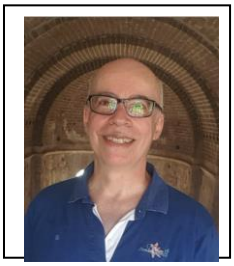
Geological and Geomorphological Effects on an Ancient Settlement: The Case of Porsuk (Zeyve) Höyük (Ulukışla/Niğde)



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ABSTRACT

Porsuk (Zeyve) Höyük, located in the Ulukışla Basin of Southern Cappadocia, is a strategic ancient settlement inhabited from the Bronze Age to the Late Roman Period. This study holistically examines the direct relationship between the region's geological and geomorphological characteristics and the settlement's location choice and architectural material usage. Research indicates that rather than being an artificial mound, the settlement is a natural fortress resting on a resistant conglomerate plateau shaped at the confluence of the Ulukışla and Kılanboğazı streams. The Oligocene gypsum deposits, which form the stratigraphic base of the mound and cause local subsidence, were extensively used as the main building stone for the outer facings (parement) of the city's massive defensive walls. Furthermore, load-bearing foundations utilized pressure-resistant sandstone, while schist (slate) was preferred for floor paving, demonstrating that environmental lithological diversity was applied with a conscious engineering strategy. The most striking finding of the study concerns mudbrick architecture. While modern conservation (encapsulation) efforts at the site produced mudbricks using the traditional recipe of water, earth, and straw (organic temper), the original ancient monumental mudbricks revealed an inorganic mineral skeleton (temper) consisting of crushed schist (slate) and arkosic sand within their matrix. This advanced material engineering strategy, developed by ancient builders with a zero-waste approach, prevented shrinkage cracking during the drying process, limited water absorption (capillarity), and immensely increased the static compressive strength of the massive mudbrick blocks. In conclusion, Porsuk Höyük presents a unique model demonstrating how the topographic and lithological potential offered by nature was transformed into high-level geo-engineering in antiquity.

KEY WORDS:
Porsuk (Zeyve) Höyük, Southern Cappadocia, Geomorphology, Ancient Architecture, Mudbrick (Adobe), Material Engineering.