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DETERMINATION OF DETERIORATION TYPES DEVELOPED IN ROCK CARVED KOIMESIS TES PANAGIAS CHURCH

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ABSTRACT

Sille has hosted many civilizations from the Neolithic Age to the present. It is a region where people of different beliefs lived together until recently. The richness of belief in this region, where Muslims and Christians live together, is also reflected in cultural heritages. Among the religious architectural structures in the region, there are rock carved monasteries, churches, masjids, and mosques. Among these structures, the church carved into the rock has the feature of being a unique monument in the region with its plan scheme, architectural elements, and frescoes. Although the low strength properties of the rock in which the monument was carved were advantageous during the construction process of the church, the harsh continental climate conditions in the region caused the monument to exhibit sensitive behavior in the deterioration processes until today. This unique monument is in danger of being destroyed today as a result of the developing deterioration. Transferring this heritage to future generations will be difficult if the essential immediate precautions are not taken.

Keywords: Rock, Deterioration, Koimesis Tes Panagias Church, Konya.

INTRODUCTION

Sille, which is approximately 8 km northwest of Konya city center, is a settlement that has survived the historical neolithic period. Sille became an essential center of Christianity because of the presence of St. Paul in the region and its location on the road to Jerusalem in later periods (Roman and Byzantium). During this period, there were about 60 religious architectural structures (church, chapel, and monastery) in the region (Danik, 1997). In the next period, with the spread of Islam in the region, structures belonging to the religion of Islam (mosques and masjids) were built. Today, the presence of monuments belonging to both religions has brought a rich cultural texture to this region. Koimesis Tes Panagias church, which

offers unique features among these cultural heritages, was affected by its atmospheric conditions. Over time, deteriorations have developed on this structure due to physical, chemical, biological, and anthropological effects. The low engineering and high porosity properties of the rock unit in which the monument was carved played an active role in the acceleration of the deterioration processes observed in the monument. If the destruction observed in this unique monument is not prevented, the structure will be at risk of extinction.

To overcome this situation, the types of deterioration observed in the monument and their formation mechanisms were examined within the scope of this study.

MATERIAL AND METHOD

Within the scope of the study, the types of deterioration observed in the church of Koimesis Tes Panagias were determined by in-situ investigations. Deterioration types were named according to the definitions in ICOMOS-ICSC (2008) and Hatir et al. (2021), and the evolution of the destruction in the monument was discussed.

RESULTS AND DISCUSSIONS

Deterioration observed in the Koimesis Tes Panagias Church

Crack, discontinuous, flaking, differential erosion, efflorescence, higher plant, lichen, moss, moist area, loss of fresco, and graffiti deterioration types were determined in the Koimesis Tes Panagias church (Figure 1), which was carved into the low-density pyroclastic rock.



Figure 1. General view of the Koimesis Tes Panagias Church

The deteriorations are directly related to the low strength and high porosity properties of the rock unit in which the structure is carved. In addition, the dominant continental climate features in the region accelerated the deterioration processes. The freeze-thaw effects in winter and wetting-drying processes in rainy periods caused the development of flaking and differential erosion deterioration types in the monument. Flaking, which is the first stage of deterioration development, has been observed in regions where the rock matrix is dense. Differential erosion types have been widely detected throughout the structure with the loss of the rock matrix (Figure 2).



Figure 2. Flaking and differential erosion types observed in Koimesis Tes Panagias Church

Another major problem identified in the monument is the discontinuous types associated with geological features and crack types that develop due to atmospheric processes. One of these types, the crack, resulted from the breakdown of structural system components that had been damaged by atmospheric processes. (Figure 3).

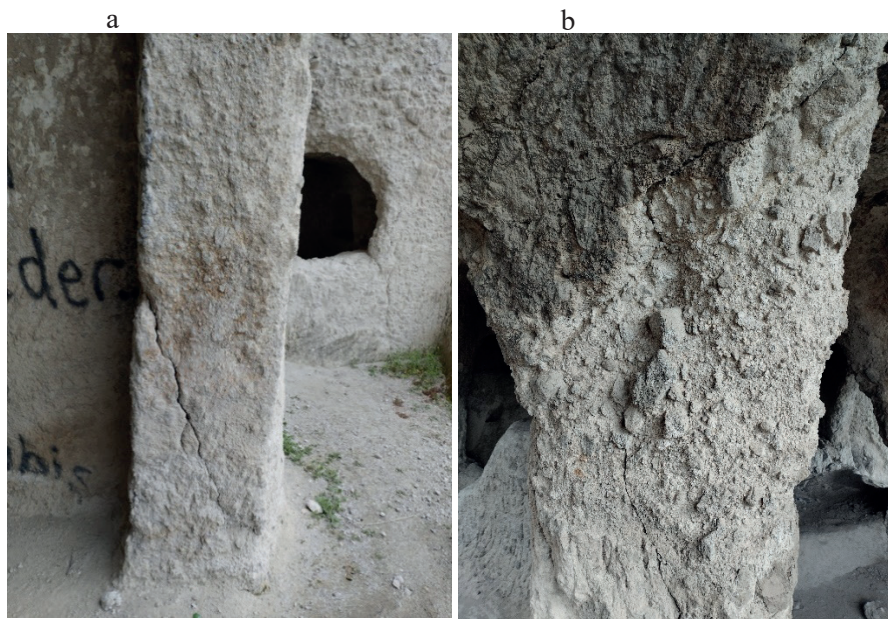


Figure 3. a-b) Examples of crack-type deterioration detected in the structure

Discontinuous type is present before the construction of the structure. With the transport of precipitation waters, the discontinuous gap widens and threatens the statics of the structure (Figure 4).



Figure 4. Discontinuous on the structure

In addition, discontinuous causes rainwater to be carried into the structure. This situation increases the moisture content indoors and accelerates the deterioration process. However, salts dissolved in water caused the development of efflorescence type around discontinuities (Figure 5).



Figure 5. Efflorescence-type deteriorations in the structure

Another effect of the water penetrating the monument is the falling of frescoes from the structure walls (Figure 6). In addition, the existence of an anthropological effect in the development of this deterioration cannot be ignored. There is graffiti from human influences outside the fresco surfaces as well (Figure 7).



Figure 6. a) Loss of fresco, graffiti, and crack detected in the structural system of the monument, b) Loss of fresco and graffiti observed on the wall



Figure 7. a-b) Graffiti examples on the structure walls

On the outer surfaces of the monument, biological colonization is effective, and higher plant, moss, and lichen growths have been detected (Figure 8).



Figure 8. Biological colonization detected on the exterior surfaces of the church

CONCLUSION

Within the scope of the study, the types of deterioration detected in the church of Koimesis Tes Panagias, which is a cultural heritage, and their development and possible static problems were examined. The rock unit on which the monument was constructed, the atmospheric conditions and the weathering associated with these conditions pose a great threat to the transfer of the monument to future generations. Crack, flaking, differential erosion, and efflorescence deterioration types were detected in the monument depending on atmospheric conditions. It has been determined that the destructions caused by the human effect on the monument are loss of fresco and graffiti. Biological developments such as higher plant, lichen, and moss were found on the outer surfaces of the monument.

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