

# The role of the chemical, hygroscopic and structural properties of an antique tile in its susceptibility to salt damage.

Tinhinane Chekai<sup>1,2</sup>, Pascale Senechal<sup>2</sup>, Marie-Pierre Isaure<sup>3</sup>, Peter Moonen<sup>1,2</sup>, Hannelore Derluyn<sup>1,2</sup>

<sup>1</sup> Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, Total, LFCR, Pau, France

<sup>2</sup> Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, DMEX, Pau, France

<sup>3</sup> Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, IPREM UMR 5254, Pau, France

e-mail address: tinhinane.attia@univ-pau.fr

Salt crystallization is one of the main deteriorating processes that threaten our cultural heritage and the salt degradation mechanism is highly affected by the properties of the considered artefact. This work focuses on characterizing the properties of a replica of an antique Dutch tile that belongs to the era between 1840 and 1850. The tile is a bi-layer ceramic material that is mainly made from clay coated with glaze and is found to be prone to different types of glaze defect induced by salt weathering. The defects are manifesting by (1) glaze peeling, (2) crazing which is glaze cracking due to high surface tension (Wilson, 1926) and (3) shivering which is a process that occurs when the separation between the glaze and the body induces the removal of a portion from the body (Wilson, 1926).

Two hypotheses were posed to investigate the observed damage patterns. The first one is whether the damage is due to chemical interaction between the salts and the tile's components during salt crystallization. This has been studied using x-ray diffraction (XRD) analysis. The second hypothesis is whether the hygroscopic and structural properties of the tile influence its susceptibility to salt damage. This has been verified by performing salt weathering experiments in a climatic chamber on tile samples while monitoring their structural changes intermittently using x-ray computed tomography. The results of this study give us a better understanding of the mechanisms responsible for the salt deterioration of antique tiles, in order to propose the most optimal future strategies for their conservation.

Wilson, B. H. (1926). MONOGRAPH AND BIBLIOGRAPHY ON TERRA COTTA. Journal of the American Ceramic Society, 9(2), 94–136.

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