

## SALT RELATED PHENOMENA IN THE MEDIEVAL CHURCH OF ȘMIG

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**Abstract.** The study presents a few results from a comprehensive investigation on a building, which was looking for - among others - explanations for visible decay phenomena. The presence of water has proved to be crucial regarding these phenomena. The investigations were made necessary by the upcoming uncovering and conservation of the wall paintings in the interior. The intervention will provide an additional opportunity for further research. Șmig is a former saxon settlement in Transylvania, Sibiu country (RO), with an almost abandoned medieval church. The northern wall of the nave and the whole sanctuary of the church is decorated with wall paintings from the 15th century. The wall paintings, except some recently uncovered parts, are covered with whitewash. An extensive analysis of the murals was carried out in order to identify the materials and painting techniques used and to evaluate their state of preservation. Certain forms of decay, such as strong deterioration of some plaster zones or pigment alteration were suspected to be related to the presence of salts in the structures, activated by changes in moisture content. During the campaign the fluctuation of moisture content and humidity was recorded. Salt examination (test stripes, laboratory exams) and pigment analysis (optical microscopy, SEM-EDS, XRD) were performed. Focusing on the green and blue paint layers a few results are to be presented. The niche on the southern wall of the sanctuary hides one of the most beautiful representations, the figure of St. Stephen and St. Ladislaus. St. Stephen's mantle was painted with coarse-grained azurite, applied directly to the plaster in a thick layer. The paint layer shows an obvious colour change from a specific height upwards. Microscopic analyses and SEM-EDS results demonstrate spectacularly the process of conversion of azurite grains into copper chloride. Salt tests performed on plaster samples confirmed the presence of chloride ions in the structure from about the height of the visible colour change upwards. Based on the salt tests carried out on plaster samples, the vertical banding of salts based on their solubility could be detected everywhere in the interior walls, with approx. the same height values starting from the given ground level around the church. Chlorides began to appear from above the height of about 2 m. In the range of 1.5-2.5 m the sulphates caused the visible, strong deterioration of the plaster. This zone can be clearly distinguished by UV-luminescence and lower wall moisture values too. In the lowest, wet zone salts were found in dissolved form at lower concentrations.

**Keywords:** *wall painting, copper based pigments, pigment alteration, salts*