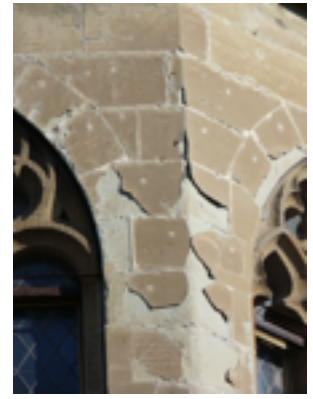


Labex MATISSE

Axe

Influence of the physico-mechanical properties of clay minerals on stone deterioration

TIENNOT MATHILDE



Desquamation effect on Villarod molasse -Fribourg city hall. © LRMH

Hosting laboratories, teams and and thesis supervisors names:

1. LRMH – Stone departement- Supervisors: Ann Bourgès & Jean-Didier Mertz
2. Laboratoire de Géologie - ENS ULM – Supervisors: Jérôme Fortin & Yves Guéguen

Research project

Sedimentary rocks used as building materials present mineralogical characteristics that are a key factor in their sustainability, especially when they contain clay minerals. Previous researches suggest that the periodically repeated swelling of the clays leads to damage of the stones. It induces material fatigue, and alterations as cracks and desquamation. The types, amount and organization of clay minerals within rocks as well as their hygric state are thus considered. This multi-scale research aims to determine the influence of the clay minerals on initiation of disorders and degradation suffered by the monumental stone under natural conditions of exposure. Innovative approach coupling mechanics and acoustic non-destructive methods is proposed to study the cracking mechanisms involved and set a hydromechanical behavior model.

Scientific results & impacts

The observation of desquamation effect developed on our architectural heritage buildings allowed the selection of three stone types: molasse, sandstone and kersantite. The nature, amount of clay minerals and the distribution of these phases related to the porous network were studied. Structural and composition anisotropy has been demonstrated, and its influence on the macroscopic mechanical properties of the rocks as well as the cracking initiation and kinetics were observed. The expansion and contraction of these stones have also been studied as a

Publication

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