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Petrophysical investigations of different porous calcareous building stones

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Many historical monuments in the inneralpine regions, such as churches, castles and monasteries were built of stone. In most cases regional materials have been used. Particularly, decorative stone types have been used preferentially as architectural and ornamental elements, in particular for columns, cornices or pilasters.

In this study five diffenent quarry stones are compared in their petrophysically properties:

i) a quaternary calcareous talus breccia (Hötting breccia) from the Inn valley near Innsbruck (Northern Tyrol),

ii) two different types of triassic rauhwacke from Northern Tyrol and Graubünden (Switzerland) and

iii) two different holocene spring tufa from Carinthia and Northern Tyrol.

All these rocks have been extensivly used in their region, but there is little known about the weathering resistancy, which is remarkably good even after several hundreds of years. This observation gave reason to this petrophysical study.

In the alpine regions the main destructive mechanisms on natural stone buildings are cycles of freeze-thaw and wettening-drying.

In this study we determined the petrophysical properties of these stone types, which are considered important for the weathering behaviour. With regard to the severe alpine climate, especially water uptake, drying and freeze-thaw cycles have been studied in detail.

Further investigations, like exposition experiments and porosity measurements by BET and Hg-porosimetry are in progress.