

**HISTORICAL BUILDING MATERIALS IN SOUTH TYROL/ITALY –  
A MINERALOGICAL STUDY UNDER THE ASPECTS OF MONUMENT CONSERVATION**

by

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A combined study on the material inventory of churches in South Tyrol/Italy as well as on the properties and weathering behaviour of prominent building materials of that area was conducted. The first part of the study was concerned with mapping on a regional scale aiming at the documentation of historic building materials and a survey of its distribution. The project comprises the following South Tyrolian areas: Vinschgau, Etsch Valley, Eissack Valley, Pusteria Valley and Unterland.

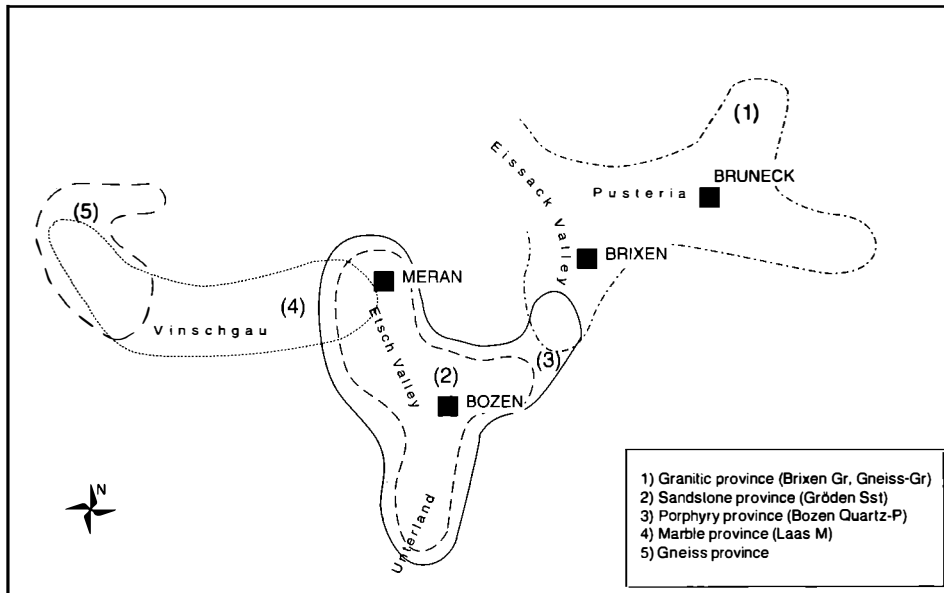
In order to document all information in one map a spectrum of symbols has been developed which allows to distinguish the kind of constructions (church, chapel, house, castle, memorial, tombstone, wall etc.) architectural elements (base, wall, tower, roof, door, window, decoration elements etc.), and materials (stone, brick, mortar, masonry etc.). This scheme provides a comprehensive survey of relevant material data useable as primary information source for conservation and restoration concepts.

The results of this mapping survey suggest a very close correlation between stone materials employed for historic objects and the local geology. This applies particularly for more remote valley areas. Petrographic mapping reveals in addition in many cases a close correlation between the functional construction task and the choice of materials. This fact is additionally constrained by the local availability of materials. A simplified map is given in Fig. 1.

The data allow to distinguish five stone provinces:

- 1) Northern granitic province (Eissack - Pusteria Valley). - Main building material in that area is the permian Brixen Granite. The middle to fine grained Biotite Granite exhibits seldom dark inclusions. A weak foliation is often the only difference to the also used Granite-Gneiss.
- 2) Sandstone province – There the Gröden Sandstone as the important building and architectural stone in the Etsch valley area [1] (Bozen-Meran) exhibits an interesting mineral indicator for weathering: Dawsonite, a fibrous carbonate ( $\text{NaAl}_2[(\text{OH})_2/\text{CO}_3]$ ), to be found frequently in pristine Gröden sandstone decreases in terms of building stone weathering and disappear due to weathering impact [2].
- 3) Porphyry province – The Bozen Quartzporphyry, recently gained reputation as pavement material, was often used in walls, but examples for the use as architectural elements such as columns are also known.

4) Marble province – The Laas Marble as very decorative material a far exported material for architectural use. As general building material it can be found in the middle Vinschgau Area [3].  
 5) Gneiss province - In the upper Vinschgau Area most churches exhibit various Gneisses.  
 A yet unsolved problem is where the stone materials for the different objects have actually been quarried. Very little documentation about that is available.



**Fig. 1**  
*Building stone provinces of historic material in South Tyrol.*

The second part of the study is concerned with the determination of basic petrographical, chemical and physical parameters, such as mineralogy, sedimentary fabrics, salt content, pore and hygric properties of the main materials. Weathering simulation experiments augment the data body about on weathering behaviour. The major problem in this study is the considerable material variation (especially within the sandstones) in combination with a broad spectrum of climatic/environmental factors. This requires long term monitoring of the climatic/environmental impact factors on building materials. However, the available data is still scarce.

## References

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