

# TAKING A CLOSER LOOK AT THE LIFE CYCLE OF MARBLE OBJECTS:

## RAW MATERIAL PROCUREMENT, MANUFACTURING PROCESSES, USE AND SIGNIFICANCE, WEATHERING, DATA MANAGEMENT, AND DISSEMINATION

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### Life-Cycle

In the wake of phenomenology and postcolonial studies from the 1970s onwards, objects were considered as having a biography. As people, things can be considered to follow a life cycle (birth, maturity, death). This differentiation of phases in an object's life manifests through changes in its form, surface features, spatial location, and context, over time and space. Widely used and re-used until today marble objects help us explore the potential of life-cycle approaches. Marble is used as a medium for a form of expression and a way to record history, culture, civilization, and worship, providing insight into the social and economic status of individual communities.

### Quarry studies

The quarries are the primary contexts of marble objects' life cycle. Studying the tool marks, the waste, and the unfinished objects at a quarry gives important information on the ancient extraction, technologies, organization, and manufacturing process. Important marble quarries can be found in the southern parts of the Alpine region in Austria, where the primary sources of the Roman marble supply for the areas of Noricum and Pannonia can be found (e.g. Gummern, Treffen, or the Slovenian Pohorje/Bachern marble) (Fig. 1).

### Artifacts / Spolia

The churches are a constituent element of today's Eastern Alpine cultural landscape (Fig. 2). In these churches, abundant marble spolia were installed and thus preserved until today, albeit under different preservation conditions. While indoors the objects have been largely protected from major sources of decay, outdoors they have always been exposed to the weathering agents (Fig. 3).



Fig. 1 - The ancient quarry at Treffen, Carinthia. A façade with ancient parallel pick marks (V. Anevlavi, OeAI/OeAW)

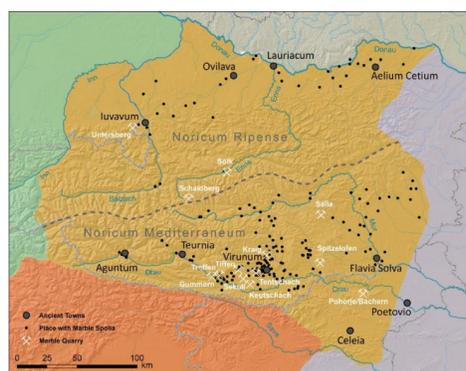


Fig. 2 - Investigated sites (black dots) and Marble Quarries in Austria (OeAI/OeAW)



Fig. 3 - Example of integrated spolia. Fragment of a cornice at the church of St. Hemma (Hemmaberg / Globasnitz) walked in front of the church entrance as a step (V. Anevlavi, OeAI/OeAW)



Fig. 4 - Grave medallion of a Celtic woman on a church in Lendorf/Carinthia from the beginning of the 2nd century (OeAI/OeAW)

### Provenance studies

Petrographic-geochemical characterizations of the Alpine white marble quarries used in antiquity and the objects are under investigation in order to reconstruct the marble landscape of Noricum. A project to systematically investigate these artifacts is in progress; however, some preliminary data are already available. Example: The grave medallion of a Celtic woman is a spolia incorporated in the wall of a church in Lendorf in Carinthia (Dedicated to St. Jakob the Elder) (Fig. 4). The white marble is relatively pure and of good quality. The analysis showed that the marble is coming from Treffen or Gummern quarries.



Fig. 5 - Representative image of spolia deliberately modified to represent the coexistence of the main forms of degradation in a single monument (E. Boccalon, OeAI/OeAW)

### Weathering

Whether outdoor or indoor, marble objects undergo continuous transformations, noticeable, triggered by atmospheric agents, or biological and anthropic activity. As a consequence, different types of degradation can coexist in the same monument (Fig. 5). Correctly identifying the nature of deterioration is a primary step in trying to reduce/stop deterioration in time and, possibly, prevent it. The behavior study of different types of marble in various micro-macroclimates aims to outline patterns and mechanisms of degradation.



Fig. 6 - Life cycle of research data (OeAI/OeAW)

### Data management

A data management plan is created and continuously updated for each project according to the data life cycle (Fig. 6). The central element is the FAIR principles (Findable, Accessible, Interoperable, Reusable), for generated and stored data. Currently, the marble database based on the FWM data model (Fig. 7), controlled vocabularies, links with gazetteers, and database structure are available at the OeAI (Project FWM and others). This forms the basis for the development of an online application and open data, accessible to the scientific community.

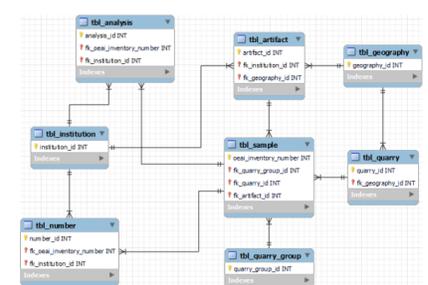


Fig. 7 - FWM - data model (OeAI/OeAW)

### Involvement of the local communities

The cultural significance, the complex biography, and the multilayered history of this part of the Austrian heritage (Roman spolia) are often overlooked by visitors and locals. The project integrates the recent past and present, through community work, documentation with the public, investigation, and protection of sites. The results will increase the historical layers of each analyzed artifact and church, creating a new level of awareness of the local heritage, in which Roman spolia, Medieval structures, the decay process, the recent past, and the present will be integrated.

