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Durability of historic plaster and mortar under severe climatic conditions

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In North and South Tyrol / Austria - Italy there are many medieval buildings where romanic and gothic plaster and mortar has been preserved. Some still are in good state despite very severe environmental conditions. Within the frame of an EU-Interreg project the composition and preservation of romanic and gothic plasters and mortars were studied.

The central interest of our studies focused on obtaining information about the remarkable durability of theses historic materials, compared to modern lime plasters and mortars. The historic monuments to be sampled were selected in cooperation with the Monuments Services of North and South Tyrol.

In a first step of this study the general state of preservation in relation to the environmental conditions at the object locality was documented. This was achieved by detailed mapping of the kind and the preservation of the material and recording of the climatic parameters as well.

In a second step samples were carefully selected and taken for laboratory work. The materials were analysed with respect to composition, fabric, load of salts and features of decay by microscopy, X-ray diffraction, electron microprobe, BET, Hg-porosimetry and salt eluation.

Our preliminary results suggest that a combination of historic manufacturing techniques, high ratio of binder versus aggregate and especially hydraulic and / or dolomitic components of the binder are essential for the outstanding durability properties of these materials.