



Stone properties and salt induced weathering of maltese Globigerina Limestone

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Abstract:

In the mediterranean area appears widespread young limestones which were use as natural building stones. A special example for the occurrence of this limestone represent the Maltese archipelago in the central Mediterranean Sea. Most buildings and vernacular architecture on this island were constructed of this so called Globigerina Limestone. During the whole colonisation the local deposit limestone were used predominantly for buildings and monuments. Many prehistoric temple and fortifications still testify for that. Today the buildings show considerable damage. The weathering process of this tertiary limestone in general has been explained as a sequence of steps, from the formation of a thick and compact superficial crust, to the loss of this crust, to the initiation of alveolar weathering. This alveolar weathering assume frequently extreme dimensions. As a consequence of the marine enviroment of Malta, salt crystallization in the pore space has been recognized as main weathering process responsible for the deterioration of the monuments.

Two samples of the Globigerina Limestone were characterized according to petrographical and physical properties like porosity, pore radii distribution, tensile strength, water and humidity transport properties etc. Investigations by means of salt crystallization tests reinforce the dependence of salt weathering from pore space properties. The phenomenologic weathering damages were registered and evaluated at representative monuments (e.g. Church Santa Marija Ta'Cwerra in Siggiewi) by means of the monuments mapping method.

According to the mapping and salt loading results, there exist a significant correlation. The zonation of weathering damages obviously indicate different salt concentration. The zone with severe weathering damages is characterized by high concentrations of halite. Consequently the salt weathering represent the main damage process of the Globigerina Limestone of Malta.